



FRIDAY, JANUARY 11.

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## Shop Notes—Chicago &amp; Northwestern.

The Chicago & Northwestern Railroad Co.'s shops at West 40th street, Chicago, are quite as complete, as commodious and as well arranged as any in the vicinity of Chicago. They have recently fitted up a new physical laboratory and a chemical department on the lower floor of a large stone building, on the second floor of which is a commodious drawing room.

On the first floor in the physical laboratory is one of the latest designed Olsen testing machines, equipped with recording devices. This machine is just ready for use, a few links and bars having been broken upon it, and already the company has commenced to get its money back, particularly in the matter of coupling links. It was found that some of the coupling links in use would stand only 52,000 lbs. pull, while standard specifications call for a pull of 95,000 lbs. Some of the best links stand 118,000 lbs. Links out of every lot received are now tested, and extensive losses, which might result from inferior links, are thus guarded against. Tests of other material are now in preparation, and soon a systematic series of inspection tests will be made for all material purchased.

In the chemical department every appliance needed for accurate and rapid work is supplied. A most effective evaporating hood has been arranged by Mr. Thompson, chief draughtsman of the company, and put into use by Mr. Davidson, the engineer of tests. A fine pair of chemists' balances is mounted upon a stone pier, built up from a deep foundation, in such a manner as to remove all shocks from passing trains and heavy machinery in operation in that neighborhood. The scale room is well arranged for accurate work. Mr. Davidson has made some excellent etchings of rails and axles, which show very clearly the difference between a rail made from the bottom and one made from the top of a steel ingot.

In the drawing room, above the physical laboratory, there are desks for about 15 draughtsmen, with ample room for the storage of drawings. This is one of the finest drawing rooms to be seen in the West. It has a large photographing room equipped with modern blue print apparatus, including a convenient room for preparing the blue print paper. A new system for making and recording drawings in this department is now being introduced by Mr. Thompson.

This road has always devoted great attention to car building details, and at the present time it is improving its freight cars in various places. The attachment of the draft spring to the draft timbers is being made much stronger, and the new castings adopted for this purpose are made in such a manner as to be easily applied to the old form of cars. It has been found necessary to strengthen the draft timbers very much of late owing to the increase in weight of cars, and to some extent owing to what seems to be an increase of recklessness on the part of the switchmen. In the standard freight car in the future this company will truss the door and end posts of the car in such manner as to prevent them from bulging outward. It will increase the buffing block on the ends of the car, and bevel the top of it off to act as a water shed; this has been found to be necessary owing to breakage and decay of end sills. More attention will be paid to the strain carried by the truss rods under the cars, and in the future the centre sills will be made considerably heavier, or will be placed closer together than at present.

A new form of door slide has been arranged by Mr. Schroyer, which allows the door to be pulled out from the car when it is being opened or shut. When in position, the door readily drops back against the side of the car, owing to the bulging of the car door and door frames. This has been found to be necessary even on new cars. Hereafter the car end sills will be made 8 x 9 in. in place of 5½ x 8 in. as heretofore.

The steam snow plows (rotary) received this fall are ready for service, and this road anticipates but little difficulty this winter from snow blockades, having a battery of rotary plows assisted by new and heavy "ram" plows made last winter.

## Steam Heating on the Chicago &amp; Northwestern.

Early this season the Chicago & Northwestern placed in quite a number of its passenger coaches a steam heating

system devised in its own shops. This steam heating system was intended to work on two plans, one a water system and the other a direct steam system.

In general the system was designed to operate as follows: The Baker heater pipes were used for direct steam when the engine was connected under ordinary conditions. When steam was shut off from the engine for any reason, then the Baker heater pipes were filled with water from a tank for that purpose, placed in the end of the car over the heater. As soon as the pipes were filled the fire was started in the heater, and the heating was accomplished in the usual way. Although thus far no serious difficulties have been found with this system, yet there are many details which will require to be changed. The officers of the road are very frank in regard to their experience with steam heaters, and fully admit that the heating question is yet a matter of some experiment with them. They are working actively for a satisfactory settlement of this question, and hope to obtain during the present season information which will enable them to decide how to equip the rest of their passenger cars in the most effective and economical manner.

One of the difficulties which they have encountered is the practical impossibility of thoroughly filling the pipes after the steam has been in them. The reason of this is that water contains a large amount of air in solution, and as soon as this water is heated in the steam boiler the air is driven off. Therefore, in all steam boilers filled with steam and water there is quite a percentage of air mixed with the steam. As this air, with the steam, passes through the train pipes and into the heating systems the steam becomes condensed but the air remains within the pipes. After this system has been in operation a considerable time there is liable to be a large amount of air in the pipes, and if there be a high place in the car-heating pipes this air will collect at the highest point and remain there, and it is very difficult to remove it.

When water is admitted to these pipes it will very often "pocket" the air, that is, the water will be on one side of the air and also on the other side in the same pipe, thus making a small section of air in the pipes. A well-known difficulty in running a Baker heater is then encountered. This is one of the difficulties encountered in all duplex systems, "duplex" because of the use of steam and water heating systems alternating in the same pipes.

Another difficulty is that the water in the tank above the Baker heater, which is used to fill the pipes when the steam is disconnected, is quite cold at the time at which it is to be used, and filling the pipes with the cold water chills the car, and, as is well known, it requires about two and a half hours to heat the water in the pipes before the circulation is well established, which, in cold weather, is sufficient time to permit the car to become thoroughly chilled. During some experimental tests last winter, where disconnecting the steam system and connecting the Baker system allowed a period of nearly two hours between the active operation of the two systems, the temperature of the cars was reduced to the freezing point.

The system in use on the Chicago & Northwestern has given no difficulty from lack of circulation, there being no obstruction whatever. The Baker heater works as well in combination in this regard as it does by itself and the steam system works quite satisfactorily when connected. No difficulties have been encountered with the new Sewall regulating valve. It has proved to be all that was expected of it.

One difficulty met is the impossibility of instructing the average trainman and car porter to run a system which is in the least complex, and many of the porters forget which valve to turn, and when they attempt to turn on the steam they often turn it off, and before they learn of the error sufficient time elapses to permit the cooling of the car; and further, when they try to disconnect one system they open the wrong valve or shut the wrong valve, resulting in a confusion which prevents either system from operating.

The Chicago & Northwestern is now fitting up several cars with direct steam, using the ordinary coal stove as an auxiliary. This direct system differs from other systems in that it divides the cars into four independent sections. These sections are not independently operated, but have independent admission of steam. One valve, however, controls them all. The object of this is to remove a difficulty which has appeared in even the mild weather we have thus far had, which is that one side of the car is much warmer than the other. When steam is admitted to the car heating pipes the car is very hot at the admission end, and at the other end of the system, where the drainage is taken off, the car is much colder, and in order to obtain an average satisfactory temperature some of the passengers have to be unbearably heated.

Attempts have been made to run pipes along the side of the car in multiple; that is, steam admitted to a "header" at one end circulates through various parallel pipes in the same direction. This is successful so far as circulation is concerned, and a complete drainage is obtained; but the difficulty with such pipes is that, to avoid great complication, they must run straight from end to end of the car, and thus passengers seated next to the windows have their feet overheated and a constant stream of hot air rushing up into their faces. To determine how great is the knowledge of their system acquired by the car porters, the officers recently had several of them explain the method of operation of that system. The ludicrous replies elicited were sufficient proof of the inability of the average trainman to understand a system which has more than one valve.

This company started out the first of the season without traps for drainage, reliance being placed wholly upon the brakemen to open or close the valve occasionally and drain the pipes, but it is now thought that some sort of a trap will have to be used. It is found that the valves are not op-

erated as intended, and the variation in the temperature of the car so produced is far too great to be permitted.

This is one of the difficulties of a direct steam system. As soon as the steam is turned on the car becomes hot very quickly, and unless the valves are closed partially soon after being turned on, the car reaches a temperature that is unhealthy. If it happens that the day is very cold and requires a full head of steam to keep it comfortable, then the drainage, collecting in the pipes, reduces the efficiency of the drainage end of the pipes and of the system. Such systems thus become wholly dependent upon the brakemen. The brakemen are often incompetent to judge what is a desirable temperature for the car, and it has been found to be difficult to get them to appreciate the value of a thermometer.

Another difficulty found is that, whereas in the old system of fire heaters the end of the car is rendered quite comfortable, by the radiation with the pipe system the lack of heat in the ends is most objectionable. This is most noticeable at stations, and on suburban trains, where the passage of persons from car to car keeps the doors constantly opening and shutting, and those passengers seated near the door are subjected to draughts of cold air which call forth loud complaints. To obviate this a radiator may be put in at the door, containing a large amount of piping, the object being to heat the cold air as it enters the car when the doors are open, and under the doors when they are closed. The company is also contemplating a plan of admitting ventilating air at this point and allowing it to pass over the heating pipes.

The Chicago & Northwestern is more liberal in the matter of steam heating than most western roads. Nearly all systems have been tried and suggestions will be received from everybody. No one can go to the shops and talk steam heating with the Superintendent of the Car Department, Mr. Schroyer, without learning something in regard to this subject. At present the Sewall coupler is in use on this road, and thus far no difficulty has been had with it. As a result of this experience it is said that the steam piping and regulation within the car is now a far more important matter than the coupling. That is, the coupling has arrived at a state of development far more advanced than that reached by the steam regulation.

So far this company has not found a satisfactory baggage car heater and is now experimenting with a sectional heater which is arranged so that with one valve a large amount of pipe can be controlled, various sections of which can be connected to the steam at will.

## Mail Transportation.

The question of the compensation paid by the government to the railroads for the transportation of mails has been for a long time the subject of considerable discussion and controversy. The rates fixed by law, while in the majority of cases reasonable in themselves, have in effect been so modified by decisions of government officers that material reductions in the gross amount payable to certain railroads have been made for several years. During the year ending June 30 last fines and deductions to the amount of \$254,000 were assessed against the postal contractors of the country.

For failure or delay in transportation or delivery of mails the law provides that deductions from the price may be made. The amount of these deductions and the rules on which they are based have been the causes of dissatisfaction, and a number of prominent roads, including the principal trunk lines, finally made an application to the Postmaster General for a clear definition of the policy of the Department. Complaint had before been made, but failed of securing any remedy, because, as the Postmaster General asserted, any action taken by him would be an unreasonable revision of the decisions of his predecessors. The present Postmaster General, Hon. D. M. Dickinson, has, however, made an elaborate decision, laying down the principles by which the officers of the Department are to be henceforth guided. The decision is dated March 1, 1888, but has only just been made public.

The complaint of the roads averred that they did not know, and could not even guess, upon what theory the fines for dereliction and deductions for delays were made. The decision says, in substance:

It is the clear duty of the Department to secure, as far as possible, the interested, active and loyal aid of the roads. Should any just cause for irritation exist, it should be removed. Allegations of unfairness should be examined and, if possible under the law, removed. Transportation of mails by the roads is not compulsory, but whether it be so or otherwise, good feeling and co-operation are necessary. It is not within the province of the Department to decide whether the present gross rates are too high; the Department must assume that the roads are entitled to the present rates by the will of Congress. The government is not in the position of a sharp business man who may legitimately take advantage of all possible means to reduce the sum payable under a contract. It must protect the person with whom it deals as well as the public. Oppression should be avoided equally with favoritism. The large discretionary powers allowed the Postmaster General are not to be fully exercised, but are made broad in order to render discipline quick and unappealable. The act of June 11, 1880, repealing that of March 3, 1879, prescribing that deductions should be made in every case, did not affect the power conferred by Sec. 3,962 of the Revised Statutes. The power to impose penalties should not be exercised where the service is actually performed, though delayed, when there is no fault, negligence or offense. The failure to perform service for which, if performed, compensation would be paid, calls for a refusal to pay. This is a reduction. If the failure is by fault, negligence or offense, then it is a case for fine. For service actually performed, though delayed, where the contractor has expended his time and his money, no deduction should be made and no fine should be imposed, unless the carrier is negligent. Innumerable small fines for delays, unavoidable accidents and violations of regulations, tends to weaken the



effect contemplated by the statute. Prompt and heavy penalties for delinquencies would be better.

Roads should make their schedules so as to provide for ordinary delays in ordinary weather. The mail involves interests of thousands of people, and its carriage must be held paramount to that of all other goods and of passengers. The interests of a single trainload of passengers are infinitesimal compared with those depending on a heavy mail. Such a train must always make way for a mail train, and in case of delinquency in this respect the penalty should be heavy. Roads should not allow themselves to be drawn by competition into establishing a rate of speed which cannot be maintained with regularity. The present rule for deductions for failures or delay of trips is: For a whole day's failure, caused by snow or flood, when all mail is carried through the succeeding day, 75 per cent. of the pay allowed for one day, 50 per cent. for two, 25 per cent. for three; over three, nothing. This rule should be modified. Generally competition will compel roads to overcome the cause of delay quickly, but in some cases carriers are slow, to the detriment of the public interest. In such a case as the great storm of March, 1888, there should be no fine or deduction for any delay, however long. In ordinary delays by snows or floods the rule will be: for a whole day's failure, the whole of the mail being carried the next day, full pay; two days' failure, the mail going through the third day, one day's pay; for a failure for four days three days' should be deducted, and where the failure is longer deduction should be made for every day except the last. A strike of railroad employes affords no excuse for failure. No road has been unable to find men and facilities to transport the mails. They must be carried, even if all other traffic has to be dropped. This precedent, established at the time of the C., B. & Q. strike, has been generally acquiesced in by the memorialists. The government will be fully able to cope with any violent and unlawful obstruction. For delinquency, resulting in failure to connect, the fine should be imposed on the lines where the delinquency occurred, and the amount based on the proportion of mail delayed to the whole amount carried over the line, as near as can be ascertained. For example, if the Pennsylvania in carrying a mail from Philadelphia to Pittsburgh fails to connect with the Pittsburgh & Castle Shannon route and the mail for that route is 1 per cent. of the total carried by the Pennsylvania, then 1 per cent. of the trip earnings between Philadelphia and Pittsburgh might be assessed as a fine. If on the Chicago-New York route the Lake Shore arrives at Chicago late because it waited at Buffalo for the New York Central, the Lake Shore should not be fined. The Railway Mail Service should report trains late and the causes thereof, and, in case on the face of the report it shall be determined that no fine or deduction is necessary, the carrier should not be put to the inconvenience of appealing for remission. No fine or deduction should be imposed for delay caused by broken axle, hot box or similar accident, which the highest degree of diligence and care have not been able to guard against. If, however, lack of diligence in applying a remedy for such delay is shown, a fine should be imposed.

The applications of the companies for restoration of the former rates of pay on routes carrying light weights has been granted.

It will be observed that this decision was written since its date, but the rules established by it are to take effect as from March 1.

#### Fast Erecting on the Cairo Bridge.

The Cairo bridge is a single track steel bridge, now building by the Union Bridge Co., for the use of the Illinois Central Railroad.

The bridge consists of 52 spans, as follows, starting at the north end:

**Illinois:** 1 deck span, 105 ft. centre to centre.  
17 deck spans, 150 ft. each centre to centre.  
2 deck spans, 240 ft. each centre to centre.  
2 through spans, 518 ft. 6 in. each centre to centre.  
7 through spans, 400 ft. each centre to centre.  
**Kentucky:** 1 deck span, 249 ft. centre to centre.  
21 deck spans, 150 ft. each centre to centre.  
1 deck span, 105 ft. centre to centre.

The total length is 10,494 ft.

The engravings show the daily progress in erecting the second channel span. It will be seen that the work was done in four days, which is doubtless the fastest erecting ever done. The trusses are 518 ft. 6 in. long between end pins, 30 ft. 5½ in. panel length, 61 ft. deep c. to c. of chords and 63 ft. 3 in. deep over all. They are 125 ft. apart c. to c. of chords, and 28 ft. wide over all. The shipped weight of one span is 2,055,200 lbs.

The erecting included handling all of the steel from the yard, and putting in the top lateral bracing. The floor system and bottom lateral bracing are not included in the four days' work. At the beginning of the work the only steel that had been run out on the false work was one pair of bars for the lower chord of each panel, from the end to the centre post. The time of running out this material is not included in the time of erecting, but it was considered actually no gain in time.

Two engines were used in erecting, one at the yard for handling the steel in the yard and raising it to the deck of the first span, and one on the false work for erecting. These engines are the "six-pull" hoisting engines designed by Mr. Wm. Baird and built by J. S. Mundy, of Newark, N. J. The engine was illustrated in the *Railroad Gazette*, Sept. 4, 1885.

The men employed were from 87 to 93 per day, averaging 91. Of these, 12 men were in the yard, handling the material, and bringing it to the derrick, and 12 were occupied in delivering it to the traveler. The erecting gang proper consists of about 25 men for each truss, distributed as follows, on each side: 8 men on the top scaffold of the traveler, 4 on the middle scaffold and 8 at the foot; 2 at the ropes, 2 at the engine, and 1 engineer. The other men were occupied in painting, and at various jobs on the false work.

The material from the yard was delivered on the bridge at the end of the first of the two 250-ft. spans, and was run about 1,025 ft. to the beginning of the span under consideration. It was conveyed on a 4-wheel push car, about 9 ft. long, capable of carrying about 10 tons. Two days before erecting began 29 car-loads of steel were delivered in the yard, which fact suggests the difficulty of having the material sorted and arranged for quick delivery in proper order on the work. In fact, the yard gang was kept very busy



October 30, 1888, 2:30 p. m.



October 31, 2:30 p. m.



November 1, 2:30 p. m.

#### ERECTING A LONG SPAN OF THE CAIRO BRIDGE.

handling the material as fast as wanted for erecting. In all of this work there was no serious accident to the men.

The erection of this span was, however, but part of the record. The first channel span of the same dimensions was erected in six days. After the first span was erected, the false work was taken down, the piles drawn and redriven for the second span, the false work put up again and the second span erected in four days as described above. This whole work of erecting the two spans and moving the false work was accomplished in one month and three days. There were about five days lost in this time, waiting for the masonry. The false work stands about 103 or 104 ft. above low water. The bents are 72 ft. high above the capping of the piles, consisting of two stories of 28 ft. each, and one of 16. The remaining height is given by the pile bents. The piles are driven in about 20 ft. of water at the low stage, and are 75 to 50 ft. long. The bents were not taken apart when taken down.

#### Snow Plows and Flangers—Northwest Railroad Club.

The first meeting of the Northwest Railroad Club to discuss "Snow Plows and Flangers" was held in St. Paul, Saturday, Jan. 5. The meeting was a great success. Thirty gentlemen were present, of whom 21 were charter members of the club. Mr. W. T. Small, Northern Pacific, President, was in the chair.

Mr. C. F. WARD, St. Paul & Du.uth, opened the discussion briefly. A number of blue prints representing different flangers and plows were on exhibition.

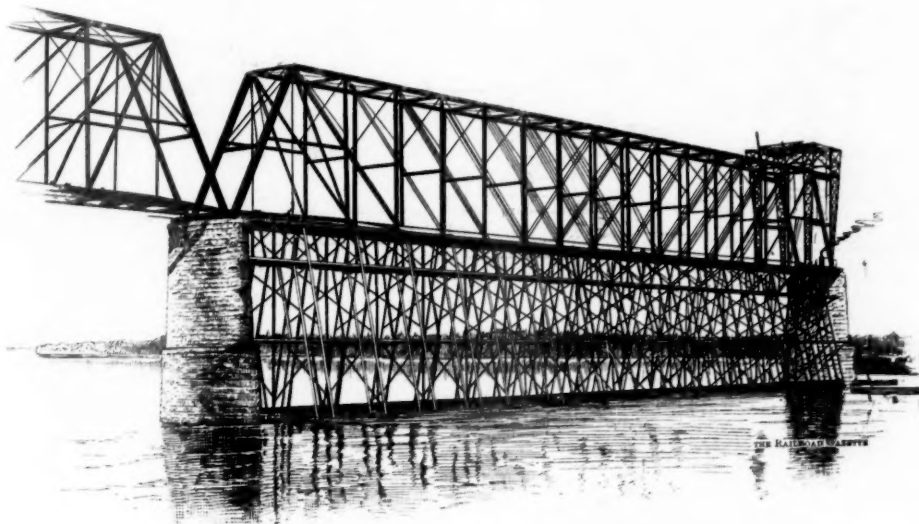
W. T. REED (Chicago, St. Paul & Kansas City): I am afraid the question of snow plows and flangers will call forth quite a diversity of opinion. Like the front end of a locomotive it will not be settled in a moment. I should judge that the Rotary plow is the one, for mountain service especially. There are places on the prairie land and level country that the Congdon plow or that type would be very serviceable. I have used the Congdon type with very great success, with the exception. Mr. Fraser states he has to put a man in front to pilot the engineer. I have removed that man, and added wings, movable at the top corners, and by extending the side of the cab out a man can see in front of the plow. These wings are worked by air, very quickly opened and closed. Moreover I have found it necessary to adopt rollers in front. Take an old steel axle, cut into three pieces, and it will make rollers enough for three plows. Make them wide enough. I have found that is more practicable than having the steady shoe. I have introduced the flanger immediately behind the plow or just below the beam of the engine. That is also worked by air. Immediately behind that follow Isaac's wire brushes. I have one already fitted up in that style. I think the Rotary plow, however, is the best plow for deep cuts. There is the possibility that running the Rotary at a speed of say 30 or 40 miles an hour there might be a chance of its choking, therefore I think the Rotary has its place and the old style of plow has its place also.

We have some of Mr. Ellis' car flangers, and they are the best car flangers I have seen. They are got up in such





November 2, 3:30 p. m.



November 3, 2:50 p. m.

ERECTING A LONG SPAN OF THE CAIRO BRIDGE.

way that they are easily raised or lowered. I am not altogether in favor of car flangers. I believe the flanger should go ahead of the engine, the brooms following. The flanger behind does not leave the rail we want. The Priest flanger is also a very good flanger and easily worked. I have no doubt it will fill the bill. Then again there is the Temple flanger, adopted on many roads, and which can be worked by air. In addition to that flanger a small plow can be bolted on the rear part, so as to answer for plow work and flanger. I do not know what Mr. Priest's flanger will cost.

Mr. PRIEST (Eastern Railway of Maine): Not more than \$60 per engine.

Mr. REED: I have always considered that, with a small engine that cannot be used in the winter time, say 16 x 24, with a suitable flanger on the front, and one crew to work it, the flanger run by air, good results will be got. I believe plow and flanger should be run by men picked out for that class of work. It is work that everyone cannot handle, and most master mechanics do not care to let every one take charge of it. Such service ought to be done properly, and by men whom you can rely upon, men who can do repairing if necessary.

The small pilot plow, bolted on engines, does good service, provided it is curved at the outer points so as to throw the snow, and not have it fall in towards the engine. The pilot plow should be bolted on to the bottom of the pilot, with the point of the pilot made strong, so that, should there be any possibility of striking ice, there would be no chance of its turning under. I think pilot plows will always be used, and will help matters out considerably, especially being put on passenger trains.

Mr. MCINTOSH (Chicago & Northwestern): Flanging attachments should be arranged to cut as narrow a space in front of the wheel as possible. That is, not wider than the face of the wheel, including the flange. Snow as a rule cut out by a pilot flanging cannot be thrown out of the cut. It is simply thrown aside and packed down, and ultimately becomes as hard as ice. It is always advisable to place an experienced man in charge of any snow bucking or flanging expeditions. They should adopt such methods as will best suit the circumstances.

We have not had the Rotary on our line, except on one occasion last winter. I should expect in case of a moderate snow storm, drifts three to five feet deep, to send out our large plows attached to the locomotive, and later, as the drifts form deeper and harder, we should expect to use the Rotary, and if the case required, might use the Rotary in one direction and those other plows in other directions.

I think if you tried the rollers under the point, just took the shoes off, you would not want to put any more shoes on. I have tried it with a chilled face, and also with the ordinary steel axle, and I found that answers better than any other. The roller is made 9 in. diam., 14 in. long, with 3 1/2 in. journals at each end.

Mr. SMALL: When the plow is left an inch above the rail and not tight to it, how does that cut in ice?

Mr. REED: It might possibly ride where there is ice up that high.

Mr. SMALL: We found the greatest trouble in gravel banks where it would run down and freeze during the night. We used to have to screw them down pretty tight.

Mr. BEAN: I believe the large "brute-force" plows should be done away with.

Mr. SMALL: The experience all through the West is that

they rush a large number of engines into a snow-bank, and then something happens, and it takes twenty-four hours before you can clear the track afterwards. I think keeping the track clear of snow is one of the most important questions the railroads have to contend with. If the gentlemen have said all they wish to say, we will hear the gentleman who wishes to speak in behalf of the "Cyclone" plow.

Mr. H. A. TOWNE: I was called upon only three days ago to come down to this meeting to represent this "Cyclone Steam Snow Plow." Why they should call upon me to do it I do not quite know, unless they are aware that I am familiar with snow bucking, and have had a great deal of experience up here in the Northwest. The Northwest is the locality in which the criterion for handling snow on railroads will be established, and it will remain with you gentlemen to say what the future snow plows will be for this country. I have handled snow in Illinois and Missouri, and in the East years before I came up North, and when I arrived here I found that the methods in vogue where I came from were entirely inadequate for handling snow here. So that whatever may be adopted here can be used there. The snow plows and flangers that have been represented here to-night all have their merits.

What is known as the Pilot Plow will necessarily have to be used in light snow, snow 1 to 2, or, possibly, 3 ft. in depth, but from the experience that has been had with the Rotary during the past winter, I believe that that principle is the coming method for removing snow in large drifts; but they cannot be used to advantage in light snow. The Rotary and the success it has attained has necessarily drawn the attention of the inventors to new plans and improvements, and I am here to show what I believe to be an improvement upon the Rotary. Mr. Towne then described the "Cyclone" plow.

Mr. J. S. LESLIE: The Rotary has made a record, and if it is the pleasure of the meeting I shall be pleased to read our first record. She is not from dreamland. It is the figures of the Union Pacific. We had no representative there when the record was kept.

Union Pacific Railway Company's Official Report of the Operation of Rotary Steam Snow Shovel During February, 1887.

EXPENSES OF RUNNING ROTARY STEAM SNOW SHOVEL, FEBRUARY, 1887.

Rotary.	
Engineer and firemen's wages.....	\$270.20
Fuel, 58 tons.....	116.00
Oil, tallow and waste.....	36.42
Material.....	70.01
	\$492.63
Pusher.	
Engineer and firemen's wages.....	\$184.20
Fuel, 111 tons.....	222.00
Oil, tallow and waste.....	10.85
Material.....	7.85
Labor.....	65.53
	\$490.43

Total.....\$983.06  
Miles run by rotary shovel, February, 1887.....2,000.2  
Cost per mile......033.5  
Cost per mile including pusher......033.5

The difference in the cost of wages on the shovel and pusher, was due to the fact that a double crew was employed on the shovel, so that it could be worked day and night when required, one crew sleeping in the caboose attached to the

pusher for that purpose, while the other was running the shovel.

The trips of Feb. 4, 5 and 6 were witnessed by Assistant General Superintendent E. Dickinson and other officials of the Union Pacific, and that of Feb. 15, by the Assistant Superintendent and other officials of the Idaho Division of the Union Pacific.

Trip of Feb. 28 was made in a very heavy snow, from one to eight feet deep, which had blockaded the line for seventy-two hours, and was witnessed by Master Mechanic of Idaho Division Union Pacific, and by Assistant Superintendent Johnson and Master Mechanic Hobart of the Oregon Railway & Navigation Company, also by W. T. Small, Superintendent Motive Power and Machinery, Northern Pacific.

Mr. BEAN: We started out a little reckless one day with the Rotary. We struck cuts all the way from 18 in. to 2 ft. deep, and we averaged 30 miles an hour—had orders not to exceed 20. I was sitting back taking it easy, and we were not stopped by anything. It threw snow over the telegraph wires and filled up an old fellow's station for him, and we got cursed for that. In heavy snow it would go about as fast as a man would walk.

Mr. BARDLEY: I remember one place where the snow had drifted so hard that you could drive right over it. We brought the Rotary there and it just sliced it off and threw it out and we went along 6 miles an hour. It was 3 to 5 ft. deep and a 3 mile stretch. We would get out of that and go along about 35 miles an hour to the next drift.

Mr. MACINTOSH: Our officers were greatly prejudiced against the Rotary when we took it out, but when they returned they expressed themselves as being satisfied that that was the proper method of handling snow in the future. It was on a trip from Tracy to Watertown. As to how long it took, we left at 9 o'clock Saturday night and they gave us three days to open that branch. It had been abandoned. We started at 9 o'clock at night, thermometer 30 below zero, and we were through to Watertown on Sunday morning at 10 o'clock. That was very hard snow, too.

Mr. H. A. TOWNE: I have frequently bucked snow, as Mr. Lewis here can testify, where we have run at as high a rate of speed as we could run a 5-foot wheel, and the engine would stop before we got into the drift a full length of the engine, and in pulling out would leave the print in the snow as though it had been molded in the sand. The Dakota Division of the Northern Pacific several years ago was allowed to snow up for the winter. There was not business enough to pay the railroad company to keep it open. Early in the spring, in February, before the snow had melted sufficiently to freeze again and make solid ice we attempted to open and we never succeeded in opening completely without going through two or three times. Wherever ice was on the rail we would break it down in front so as to enable the plow to cut under it. We would run with one engine. In any snow it is always safer to run with one engine; run in as far as you can and then run the trailer up to pull out. In my experience in handling almost any kind of snow, whether light or hard, you can make greater speed running one engine with trailer behind than running two or three engines. The last severe blockade we had on the Northern Pacific we were three weeks going from Fargo to Bismarck. I started out from this end with three engines. We were obliged to pick and chop out the ice with axes. I succeeded in getting through with a single plow, however, by never running into a bank that we did not understand. Test holes were continually put down. After the division was snowed up for the winter and we started out to open the road it became necessary to take men enough, provisions enough and fuel enough to stay until we got back. So we always took a work train with sleeping cars and accommodations for the men. We worked days and tied up nights. That was the only way we could get through. Three years ago this winter I took a trip over the Santa Fe road to California, and we encountered a snow blockade at Newton, Kan. Ahead of us there were three Raymond excursion trains in the snow banks. Fortunately for them, they had their provisions with them. We remained there for just one week, in Southern Kansas, where the snow rarely gets harder than the first snow that falls on the Northern Pacific. With the Northern Pacific appliances I made up my mind I could have opened that whole road in 24 hours. That incident will serve to illustrate my previous remarks, that the appliances adopted up here will answer for everybody, whereas those in use and doing good service farther south will not do here at all.

Mr. W. H. LEWIS: As Mr. Towne has stated I was associated with him on the Northern Pacific when that portion of the road between Fargo and Bismarck was abandoned. It was necessary to open that track by the time the river opened, to compete for Montana trade. To do that it was necessary to start in generally about the 15th of March. The cuts were drifted full and in many cases between each succeeding storm there had been thaw and the hollows had filled with water and frozen and in many instances there was solid ice 2 to 3 ft. in thickness. As long as the ice was above the rail the plow would break it. To guard against accidents we were compelled to sink test holes through the cuts at regular intervals to determine whether there was any ice on the rails. The snow is composed of minute globules of ice that have apparently drifted for miles. To illustrate the hardness of the snow—on one expedition we ran into a drift where the snow was from 18 to 20 ft. deep. The snow had fallen early in the season, before the frost had entered into the ground, and the immense pressure forced the truck wheels against the rails so hard as to break the rails. When we pulled out, the snow ran down on the rail again, and it was not discovered. When we took the second run the point of the plow struck and doubled under the engine. The snow was so hard that all that was necessary to do was to dig down straight on the line of the engine, and the snow would hold it, as if it were on the top of a solid bank. I had a controversy one time on account of putting more power behind the plow. I had contended that the snow was so hard it was impossible for an engine to stand any more power than we were then using. To demonstrate what an engine would stand I foolishly took the plow myself, and took a run. When we struck the snow, we were going as fast as two engines could strike, and the force was so great that it sheared the tank from the frame. Snow of that character, in my judgment, can better be handled with a Rotary than with a wedge-shaped plow, and I think there is an economy in time as against the wedged plow. Take into account the time necessary to dig those engines out, and prepare for another run, and it is more than equivalent to running a Rotary through the same depth of snow at a speed that is not faster than a man could walk. I have frequently, in running into snow, 10 to 12 ft. in depth, been from 35 to 50 minutes digging out the pushing engine and probably 20 minutes digging out the plow engine. That represents nearly the loss of an hour to each run taken. I think that the wedge plow can be used to advantage in snow not exceeding four feet in depth to a much greater advantage than a Rotary plow, but in the snow that is encountered in this country, where it exceeds four to six ft. in depth, I think there is no better way of handling it than with the Rotary.

Mr. LESLIE: I have arranged with our people to build more Rotaries than ordered this year. The President of the Rome, Watertown & Ogdensburg will furnish us with 25 miles of track for clearing the snow, and give sufficient time



for notice to be given to railroad officials all over the country, that we may practically demonstrate the Rotary in the East.

A resolution was adopted that it is the opinion of the meeting that the Rotary principle is the right one for plows in heavy snow, but in light snow—say 2 or 3 ft.—the wedge-shaped plow gives good results.

The discussion on flangers was carried over to the next regular meeting.

#### Side Rod Straps and Brasses.

We are indebted to Mr. Gandy, of the "Queen and Crescent" lines, for the blue print from which the accompanying illustrations have been made of side rod straps in use by that system. With reference to these details we cannot do better than to give Mr. Gandy's words. He says: The origin of this improvement dates back some three years, at which period we were troubled constantly with consolidation engines stripping themselves through a broken strap; more than once the engine and a portion of the train were ditched. The engines were not three years old, and as far as could be ascertained had been carefully used, and as they all developed the same weakness, or rather broke down in the same manner, it was conclusive evidence that that point was one of the weakest about them. The middle connection side rod strap invariably parted through the key-way. The engravings illustrate how we have dispensed with key-ways altogether, and gained:

1st. A cheaper form of strap by \$40 per set for consolidation engines, the gain being principally in the machine work, having no key-ways to slot.

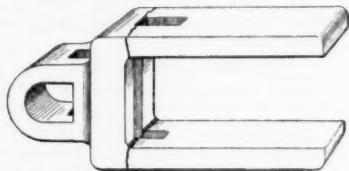
2d. A better, easier and safer adjustment for wear. The wedges bearing the entire width of the brass, the adjustment being graduated by any desired number of threads per inch, and also by operating by a screw, rendering it an impossibility for an engineer to drive on a key when the brasses are bearing together, or cause the pin to heat by driving the key too tight when they are bearing on the pin, and yet not together; and,

3d. Gaining more sectional area at the weakest point without increasing the size of the strap.

Since using them on consolidation engines, we have not had a single report of a hot wrist pin, and the engineers themselves, usually averse to anything out of the ordinary, now prefer them.

About a year ago one of our 19 x 24 moguls stripped herself in the same way as the consolidation engines. Mr. Meehan, thereon, decided to make this form a standard to take the place of all strap end rods, as far as repairs were concerned. There is little doubt but that the solid end side rod when well fitted in the primary stage, and the pins being of as large a diameter with as great a length of bearing as possible, gives the best all around satisfaction, this latter form being our standard for new engines, and in cases where repairs are so extensive as to necessitate new rods and pins.

Speaking in favor of the bushing, I would cite the following: Engine 82, 18 in. x 24 in. passenger; 68 in. wheels; main pin, 4 1/2 x 4 1/2 in.; side rod pins, front and back, 4 in. x 4 in., entered service new October, 1883, and ran steadily until May 15, 1886, when she was wrecked, having made 153,669 miles, pulling an average train of six cars over a hard road. During that period and mileage, her brasses were not touched, and the lost motion had not become so much as to make her "pound." She had solid ends



and bushings on back end main rods and side rods. I inclose a sketch showing the way our straps used to part.

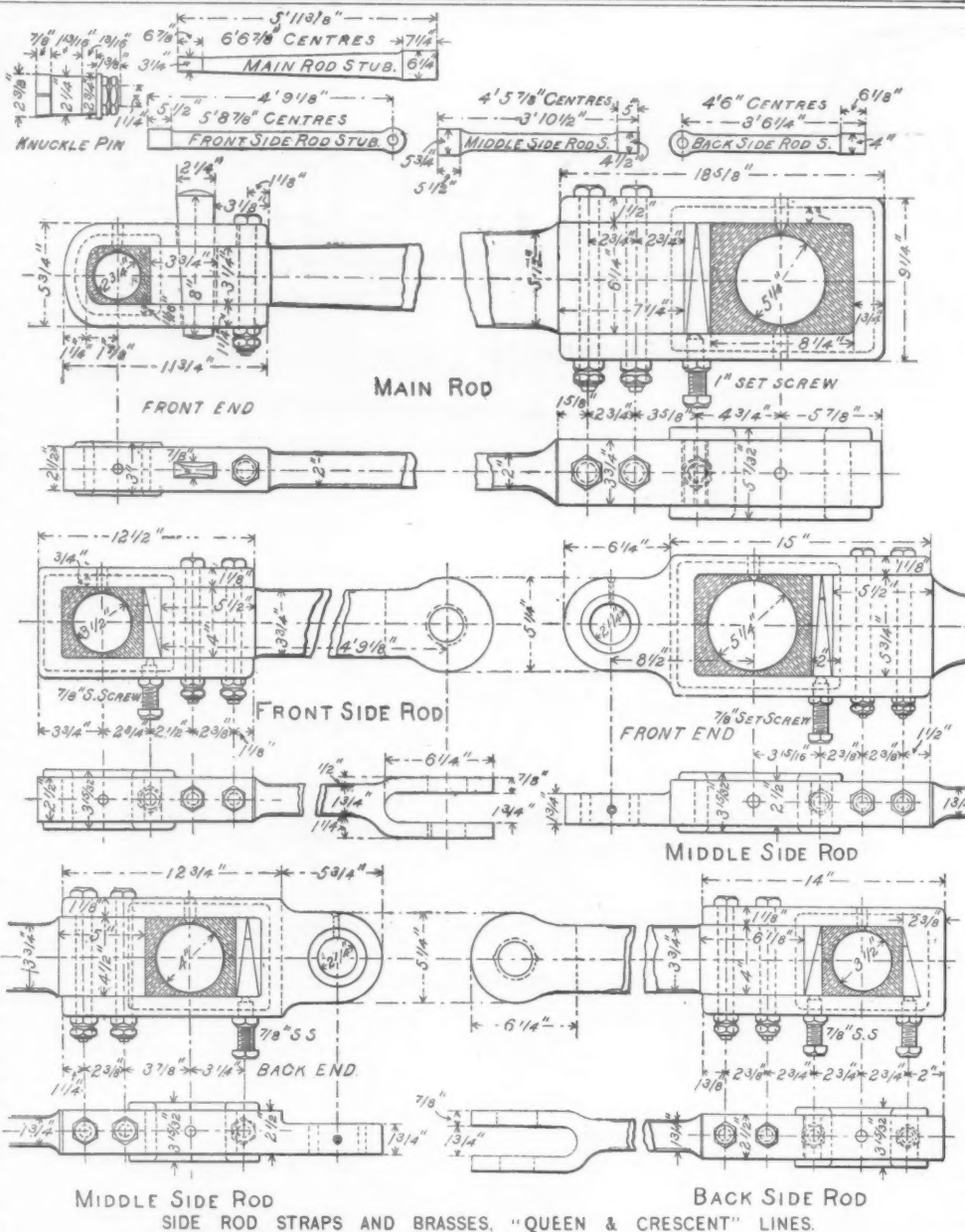
I might say, that during the last year I have seen a patent which was granted for a somewhat similar method of adjustment, as the wedges shown on blue print, but I do not think there is any valid patent to stand in the way of its use, as our drawings date back four years, and I believe a single wedge had been used prior to that.

#### Chairman Cooley on the Inter-state Commerce Law.

Chairman Cooley, of the Inter-state Commerce Commission, made a speech at the banquet of the Boston Merchants' Association on Tuesday evening of this week, in which he referred at length to the recent criticisms of the Inter-state Commerce law, and to the causes and remedies of rate cutting. He said:

The urgent call for a modification of the act which comes from railroad circles has sprung up recently. There were, indeed, some objections made to it after its passage, as well as before; but when it was given effect it was found—quite to the surprise of some who had prophesied disaster to the railroads from it—that the disasters did not follow. Indeed, for six months or more after the act took effect it was generally conceded that it helped the railroads instead of harming them. They gained in revenue from the anti-discriminating clauses more than they lost from the prohibition of the greater charge upon the shorter haul. Every one ought to have been gratified with this, because the gain to the roads was not at the expense of the general public; it resulted principally from taking away unfair advantages which before were benefiting favored persons. The period during which the law operated most to the benefit of the railroads was precisely that during which its provisions were best observed. This is deserving of more attention than it has received from the railroad managers. It was also the period during which the law was complained of the least.

There are very vigorous complaints now. They relate mainly to the fourth section, and to the prohibition of pooling. The first mentioned clause embodies a principle right



in itself. In large sections of the country the roads have come into conformity with it and have not suffered loss from doing so. In others it was not practicable to do so, at least immediately. But the difficulties are greatly increased by the excessive competition of the roads at leading points, and they will diminish as the managers come to better understanding among themselves. If the managers give their best efforts to come into conformity with this provision, they will be very likely to find—perhaps to their surprise—that they can do so without injury. What they lose in one way they will make up in others.

Judge Cooley then referred to the marvelous ingenuity with which railroad men had contrived to evade the spirit and intent of the law. These devices, however, invariably diminish income. However plausible the excuses, all were plain evasions of the law, which intends that our railroad business shall be done openly and with full publicity. Managers defeat this just purpose, and it is in poor taste for them to put themselves upon the stand to prove that the law is injuring their roads. He continues:

Besides, the evidence they bring forward is not to the point. We can all see that the old practices which the law undertook to put an end to, but which are still persisted in, are harmful. What we need to be shown is that the fruits of obedience to the law would be equally injurious, or perhaps more so. These are precisely the proofs that are not brought forward. The reply made to us when this is said is that the disregard of legal obligations comes from excessive competition. Formerly this was kept within bounds by the device of pooling, but pooling is now prohibited, and there are no means within the reach of the railroads to protect them against rate wars. These wars will break out inevitably, and when they do the roads will reach for traffic by every available means. If one gives rebates another will; if one puts its passenger tickets into the hands of outside parties its competitor is compelled to do the same. This is the plea.

Now, putting aside for the time being the question whether pooling ought or ought not to be allowed, I must insist that the argument now made for it is radically unsound and vicious, because it rests upon an assumption that violation of law by one is justification for violation by another. The whole sentiment in railroad circles on this subject is not only opposed to sound public morality, but it necessarily tends to the perpetuation of the very evils under which the roads are now suffering. Every man ought to be a law-abiding citizen—railroad managers just as much as any other class of persons. Violation of a law which has a just purpose in view, and especially of any provision of the law that is unmistakably just and right in itself, ought to be odious. Any citizen knowing of the violation, instead of imitating it ought to assist in bringing the offender to justice. If the violation particularly affects any one business the persons engaged in that business ought to feel themselves, under special obligation to see not only that the crime is punished, but that it is made disreputable. If a sentiment to any such effect exists in railroad circles it has not been made known outside of them.

I do not join in any general indictment of railroad managers. I know too well the fact that a great many among them desire that the law shall be enforced, and would willingly obey it to the letter if they thought under the circum-

stances they could do so; but many even of this class are affected by the old notions growing out of old and chronic abuses, and when a competitor breaks the law, they do not hesitate to do the same thing in order to get even with him. The crime thus spreads from one to another until all are involved. Each one justifies his own conduct by the bad conduct of the one who precedes him in disobedience, or is supposed to have done so. He would have us understand that he was compelled to violate the law because another did, and he recognizes no obligation as a citizen to either institute prosecutions himself or to furnish the evidence to the public authorities.

Now, I know nothing corresponding to this in any other line of business. If one merchant cheats his competitor by dishonest and criminal means the latter does not retort in kind, but hands the case over, with the proofs, to the public prosecutor. We never hear from one merchant that the criminal conduct of his competitor forces him into like conduct. The plea of a saloon keeper who should throw open his doors at forbidden hours because he found his rival had a back door open, and was likely to draw away business, would be overruled as promptly by public sentiment as it would be by the courts. Even where an alleged secret cut in rates is met in a perfectly legal manner by an open reduction, the question often remains whether the alleged offence was not imaginary rather than real, and whether if real it would not have been possible to correct it by an appeal to the law instead of making a costly sacrifice of revenues by measures of retaliation.

The demand that pooling be permitted is too indefinite. Do the roads want voluntary pooling, as formerly, or pooling sanctioned by law; or do they mean something else? The old pooling was not so harmful as supposed, nor so beneficial as now claimed. The most that can be said in its favor is that it had a tendency toward the steady maintenance of rates. It was a contrivance whereby it was made to the interest of roads not to push competition to excess and not to engage in destructive rate wars. Judge Cooley then went on to explain the difficulties of pooling and the reasons why present conditions would not be met by a law permitting it. The various conflicting interests could no more be satisfied than could a miscellaneous collection of carnivorous beasts with a carcass insufficient to more than whet their appetite. The pooling family is very seldom a happy family, and all the elements of disorganization attend it from the start. The Canadian Pacific was capable of dictating terms to the American Transcontinental roads. There is no limit to the possibility of forming roundabout lines which will disturb rates. Legalized pooling would have only one advantage, payment of balances could be compelled. Good faith would still be an essential. Trusts are to be feared, but they are as different from a pool as a despot on the throne from the player who mimics him on the stage. The leading Trust of the country has cheapened an article of commerce, but this is insignificant compared with the mischief worked by the merciless power of concentrated capital. The speaker continued:

Anything in the nature of a trust that should bring the railroads of the country, or of any considerable section of the country, under a single head, with irresistible power to divide business and make rates, would be more to be dreaded than any other trust ever formed or proposed. The reason would be obvious; it would control more property and have



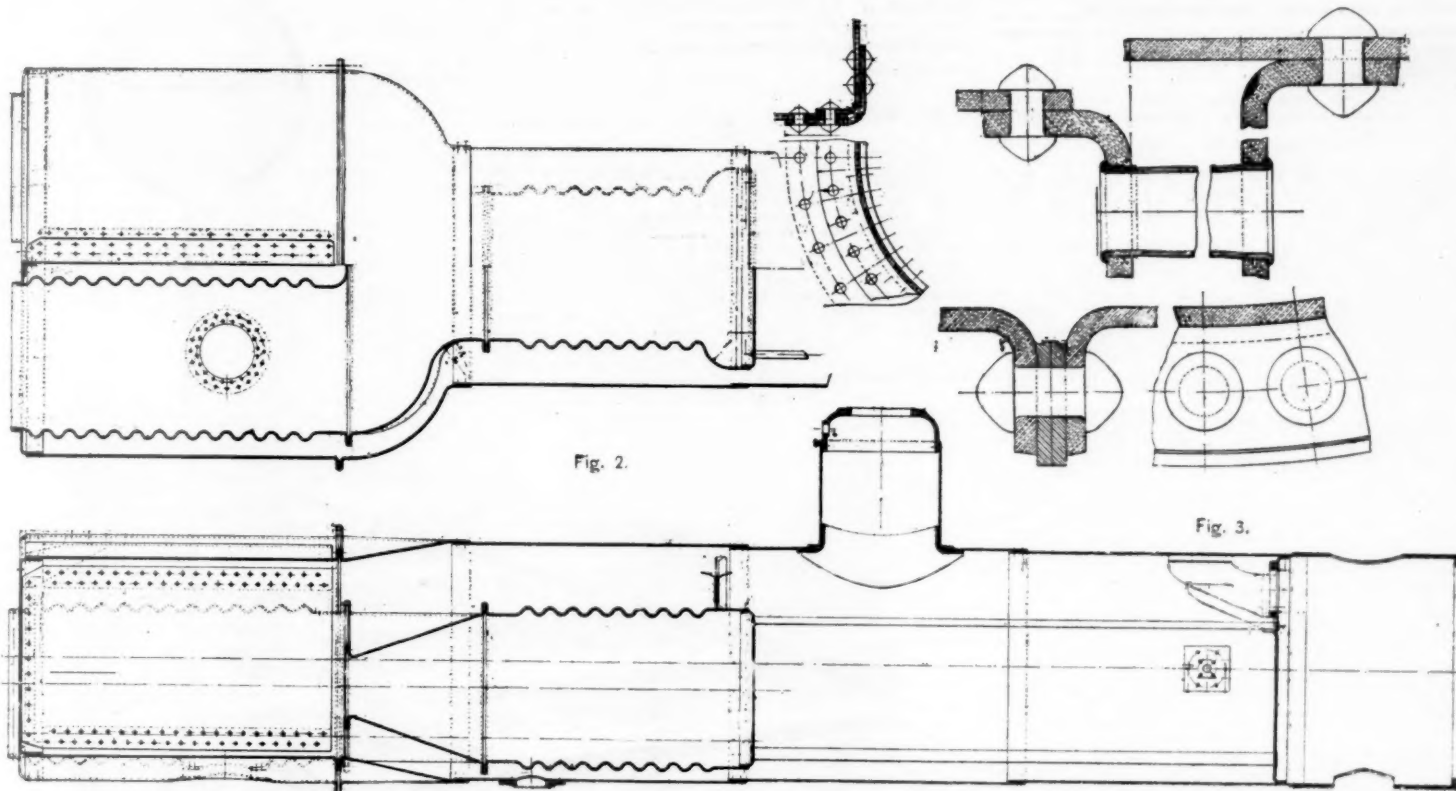


Fig. 1.  
BOILER OF THE STRONG LOCOMOTIVE.

more power of controlling and coercing the action of individuals than the public authorities. It would, besides, if formed now, in all probability fall to the control of that class of managers who, in handling railroad property, do not hesitate to subordinate law to corporate interests and rivalries. No prudent man would give assent to a railroad trust until he was first shown that very effective legal restraints had been put upon it.

Judge Cooley then referred to the evils of overbuilding. The proposal of a new railroad is very often a mere confidence operation.

It is not probable that pooling will be legalized until managers show a different attitude toward the law and a better disposition to observe agreements. The breaking of agreements has been the radical difficulty in the past. Many recent wars have not had the slightest justification, either in policy or in morals. The emigrant agreement was as good as a pool, but it did not prevent the waste of a large amount of revenue. Something besides the law needs reforming. The bribing of an agent to underbill goods ought to be as disreputable as the hiring of a thief to steal a neighbor's goods. Mr. Adams had spoken none too strongly on this subject. Numerous devices opposed to the spirit of the law may still be legally practiced. Rate cutting is done by means of excursion tickets, and one company can cheat a connection by the manipulation of coupon tickets. The general manager of a long line of road, who was careful, as he thought, to render cutting on his line impossible, was astonished recently by having a "ticket broker," to whom he was a stranger, offer him a ticket over his own line at a cut rate. He at first pronounced the ticket a forgery; but it was not a forgery, nor was it a ticket that had been partly used. It was his part of a coupon ticket which had been put into the hands of the passenger agent of a distant road, and this agent had cut it off and passed it to the scalper as a means of cutting the local rate.

Ticket scalping can be broken up by the application of ordinary business prudence which controls other interests. If the combination in the same person of the two characters of railroad manager—in whatever official position—and of speculator in railroad stocks could be rendered impossible we might hope to see the time when the question, "What is right and wrong?" in railroad matters would be heard a good deal oftener than it is now, and the question, "What can be done in evasion of the law without encountering its penalties?" a good deal more infrequently.

#### The Strong Locomotive "A. G. Darwin."

This is the latest example of the Strong locomotive, and was constructed by the Hinkley Locomotive Co., of Boston, for the Strong Locomotive Co. It contains some improved details, suggested by experience. The boiler, which is regarded as one of the most important, if not the most important feature of this novel type of locomotive, is represented in the accompanying sketches.

The boiler here shown consists of cylindrical shells and furnaces, composed of seamless steel cylinders, figs. 1 and 2, the furnaces, which are exposed to external pressure, being corrugated, and thus formed into a series of compound arches, well calculated to resist collapse without staying. The boiler has two furnaces, connected by a junction piece to a common combustion chamber, whence the products of combustion pass to the fire tubes. The transverse seams of the outer shells are double-riveted, the longitudinal seams being welded, and the joints connecting the junction piece with the furnaces and combustion chamber, fig. 3, are so constructed that no rivets are exposed to the flame or fire. By using this mode of construction the stay bolts and crown bars required in the case of flat sheets and box furnaces are dispensed with. The cir-

lar furnace of corrugated steel represents the most advanced practice for marine boiler work where high pressures are carried. Mr. Strong makes an interesting comparison between this style of fire-box and the ordinary type used in locomotive boilers:

"While the stayed form of fire-box must always be regarded with a certain amount of mistrust on account of the liability to broken stays and cracked sheets, cracks originating from strains set up by staying and from stay-bolt holes, this form of boiler, once strong and constructed of the right kind of material, is entitled to confidence, as there is nothing to break, the parts being self sustaining and free to contract and expand without injury to themselves or to other parts. Another important advantage of this boiler as relates to safety is the reduced liability to dangerous explosions from low water as against the stayed fire-box. When a stayed fire-box is allowed to become overheated from the water being allowed to come below the crown-sheet, a disastrous explosion almost always follows, due to the crown-sheet pulling off the heads of the crown-bolts or pulling out and tearing from one stay-bolt hole to another, and the entire fire-box is blown out or the entire boiler destroyed with whatever happens to be in the immediate vicinity. Experience has demonstrated that it is not so with the corrugated furnace, as with it an entirely different condition of things exists. It is, in the first place, a cylinder of the clean steel without any perforations, and being a cylinder is in the best form to resist collapse from external pressure, and being corrugated into a series of compound arches, it has a great tendency to retain its form, even when hot or partially collapsed. Now, when the water is allowed to become low on it, it must necessarily uncover a small portion of the top first, which becomes heated and sags down where heated only, and if the water is still allowed to go down, will gradually follow down as the water is lowered, but will not rupture and tear, as does the stayed fire-box. This is a well demonstrated fact, and while many thousand corrugated furnaces are in use and are being used every day under the forced draught and high pressures of our fast transatlantic steamers, and while many cases of low water have occurred, not a single dangerous explosion with rupture has been recorded, and to-day the corrugated furnace has become standard for almost the entire civilized world for first-class marine work, and the square stayed fire-box is obsolete in the same field."

The Strong boiler is made entirely by machinery, the seams being riveted by hydraulic pressure, and the rivet holes being either reamed or drilled by machines, whence it is claimed that the boiler can be built more cheaply and durably, with the same factor of safety for high pressures, than the ordinary type of locomotive boiler. The boiler is designed for a working pressure of 175 lbs. per square inch, and the principal dimensions are as follows:

Diameter of shell.....	60 in.
" " furnaces.....	42 "
Length of furnaces.....	7 ft.
" " junction piece.....	3 "
" " from bridge face to tube sheet.....	6 "
" " fire-door.....	9 "
Grate surface.....	18 sq. ft.
Heating surface.....	50 sq. ft.
Weight.....	1,650 "

The Strong locomotive is designed for very heavy and fast train service. Fast running calls for the development of con-

siderable power, and consequently a large consumption of coal and a large supply of steam—in other words, a large and efficient boiler capable of burning considerable coal, and burning it economically. The boiler here shown is designed to burn bituminous coal, but it is stated that anthracite fuel can also be used without making any change. The two furnaces are ordinarily fired alternately, with the idea of having a continuous flame from incandescent coal. The amount of heating surface exposed to direct flame is unusually large on account of the great length of furnace, including junction piece and combustion-chamber, and the reasonable claim is made that more intimate flame contact can be obtained on corrugated than on flat surfaces. Since a large amount of coal must be burned in the furnace, considerable grate surface is desirable if the coal is to be consumed with economy, and the Strong fire-box can be constructed with ample dimensions without encountering the difficulties due to the use of extended areas of stayed furnaces. The fire-box being comparatively shallow, the extension forming the junction piece and combustion-chamber, is perhaps necessary to ensure good combustion, by providing length of flame instead of height; and although a combustion-chamber, *per se*, may not be the most desirable mode of securing good combustion in general, it is probably of considerable advantage in the Strong boiler.

It is, of course, comparatively easy to design a boiler of any size and capacity, if no attention is paid to the weight; and the means employed for carrying the Strong boiler are of interest. The Strong locomotive weighs, with coal and water, 136,000 lbs.; and Mr. Strong says:

"This locomotive, as a type, differ somewhat from ordinary practice, as regards its running gear, and the arrangement, made necessary primarily by reason of the shape of the boiler, possesses advantages that are worthy of consideration, as it meets the much discussed problem of how to make a boiler large enough to do the work and still be able to carry it, and while doing this it meets two or three other very desirable requirements. It makes it possible to make a locomotive that, while large enough, is very easy on the track and bridges, and while easy on these it must necessarily be easy on itself and the man who runs it. It is equalized from in front of the leading driver, back to and across the trailing or pony truck, and back to the same point forward of the driver on the other side, so that when it strikes any unevenness in the track the shock must go through all these before it reaches the engine, and is lost, so that one does not feel any jar or jolt on the engine. The fulcrum on the lever that equalizes the trailing truck can be shifted to put any required weight on the drivers, while the surplus weight is carried on the truck, and such an amount is put on the drivers as the road and bridges will safely carry. As the trucks are both swing bolsters, the engine curves very nicely, passing a curve without any of that lurching of the front end so noticeable on ordinary locomotives, and as the wheels come almost directly under the centre of gravity as well as almost midway between the front and back trucks, the engine is free from that rising or surging of the front end, so common in the American type of locomotive."

The "A. G. Darwin" has cylinders 19 x 24 in., 4 driving wheels of 68 in. diameter, leading truck wheels 33 in., paper, and trailing truck wheels 42 in. diameter, cast iron



with steel tires and retaining rings. The weight of the locomotive, 138,000 pounds, is distributed as follows:

Driving wheels .....	72,000 pounds.
Front truck .....	34,000 "
Trailing truck .....	30,000 "
Total wheel base .....	29 ft.
Spread of front truck .....	7 " 6 in.
From centre of front truck to front driver .....	10 " 6 in.
From back wheel of front truck to front driver .....	7 " 6 in.
Spread of drivers .....	7 " 6 in.
From back driver to trailing truck .....	8 " 6 in.

The axle bearings on front truck are 6" x 11 in.; on drivers, 8 x 11 in.; on trailing truck, 7 x 9 in.; horizontal crank-pins on main rods, 5 x 5 in., and on side rods, 4 x 4 in. Mr. Strong says:

"As an evidence that these bearings are ample when properly fitted for the loads carried, none of them have ever warmed on this engine, although she came right out of the shop, went to work and was put to a speed of 60 miles per hour the second day. None of the axles or pins have ever been warm, although the engine has pulled some heavy trains up to a speed of 73 miles per hour, and has made 70 miles per hour continuously with 7 cars."

The Strong valve gear has been fully described in these columns (see *Railroad Gazette*, March 19, 1886), but the present design differs somewhat from the first arrangement. One eccentric is now used to actuate the four valves of each cylinder, but the original form of rocker which brings the valve to rest after it has traveled its lap, is retained. The valve gear is also all placed inside with nothing projecting over the frame; and the advantages claimed for this arrangement and the valve gear in general, are thus described by Mr. Strong:

"The rocker boxes or actuators on the cylinders are reversed, with the rock shafts turned back toward the saddle. This somewhat simplifies the valve gear, while retaining the same motion on the valves as was secured by the previous arrangement, and enables the same standard valve gear to be used on all classes of locomotives, regardless of the arrangement of wheel base or diameter or stroke of cylinder. This makes it possible to manufacture the parts of this valve gear to standard dimensions with special tools, and by so doing to reduce the cost to less than that of the link motion as ordinarily produced.

"In the Strong valve gear balancing is done away with, and friction, wear and leakage is avoided at the same time. As by the peculiar arrangement of the rock shaft centres the valve is allowed to travel to almost a complete state of rest, while the corresponding valve at the other end of the cylinder is doing its work and while it has its hardest load, and is thus moved just at the time when compression has relieved it of its load; and its travel being very slight at most—only  $\frac{1}{8}$  in. on the steam valves at an early cut-off and  $1\frac{1}{8}$  in. at full travel—the work done by the valve gear is very light and the wear of its parts almost inappreciable. Hence the valves always remain tight, there being no tendency to wear or leak, and the necessity for re-facing of valves almost disappears."

Mr. Strong adds that by the use of this locomotive "Results equal to the best obtained from compounding with the link motion can be obtained without the complications and difficulties involved in compounding;" but the proof of this statement is not furnished. It seems desirable to make a thorough test of this latest form of the Strong locomotive, with careful measurements of steam and coal consumption.

#### The Barry Automatic Train Indicator.

The illustrations shown herewith give a very clear idea of this instrument. As heretofore described in these columns, it is for the purpose of indicating to engineers the number of minutes which have elapsed since the departure of the last preceding train.

If the engineman, on reaching the signal, sees the hand fly back to 0, its normal position, he knows that the instrument is in working order, and that his train is protected, even if the clock should run down or stop from any cause. The worst it could do in that case would be to make the interval too short, thus being on the safe side. If signals are located at short intervals, a following engineer knows by the successive indicators, as he passes them, whether he is losing or gaining on any preceding train which may be within 25 minutes of him. The mechanism, as described in the manufacturers' circular, is a strictly first-class eight-day clock movement, warranted to run throughout winter and summer with such slight variations as to in no way affect the accuracy of the record. An auxiliary movement is attached to the clock, to swing in and out of mesh with it. When in mesh, the hand is carried to 25 and then stops; when out of mesh, the hand springs back to 0. The gradual slight depression of the track rail by the front truck of a locomotive, depresses the horizontal iron rod, which in turn depresses the upright rod, and through its connection and spring throws in and out of mesh the auxiliary and clock movement. The signals are entirely of iron, and put in below the frost line. The parts on the ground are boxed and made waterproof. The head-light lights the signal sufficiently to enable the record to be taken by the engineer at any rate of speed.

These signals have been in use on the Fall Brook Coal Co.'s road for a year, and the Superintendent, Mr. G. R. Brown, praises them. He says:

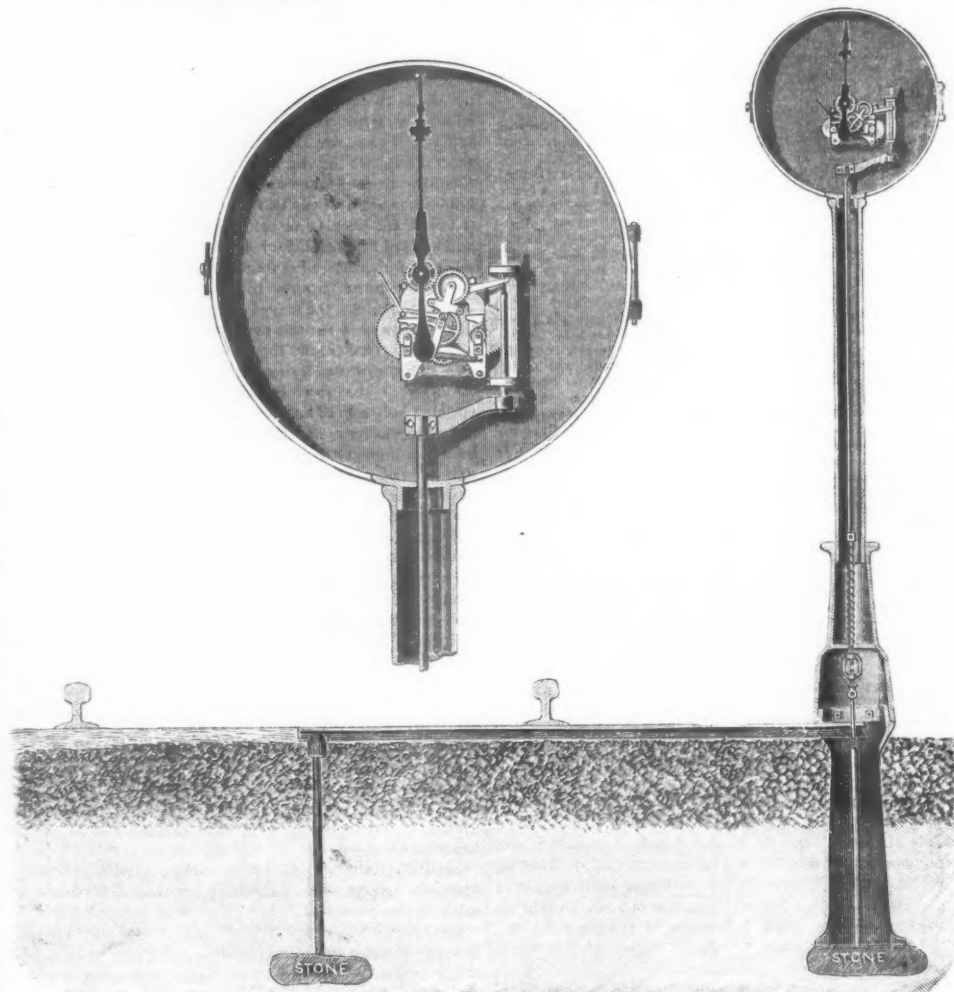
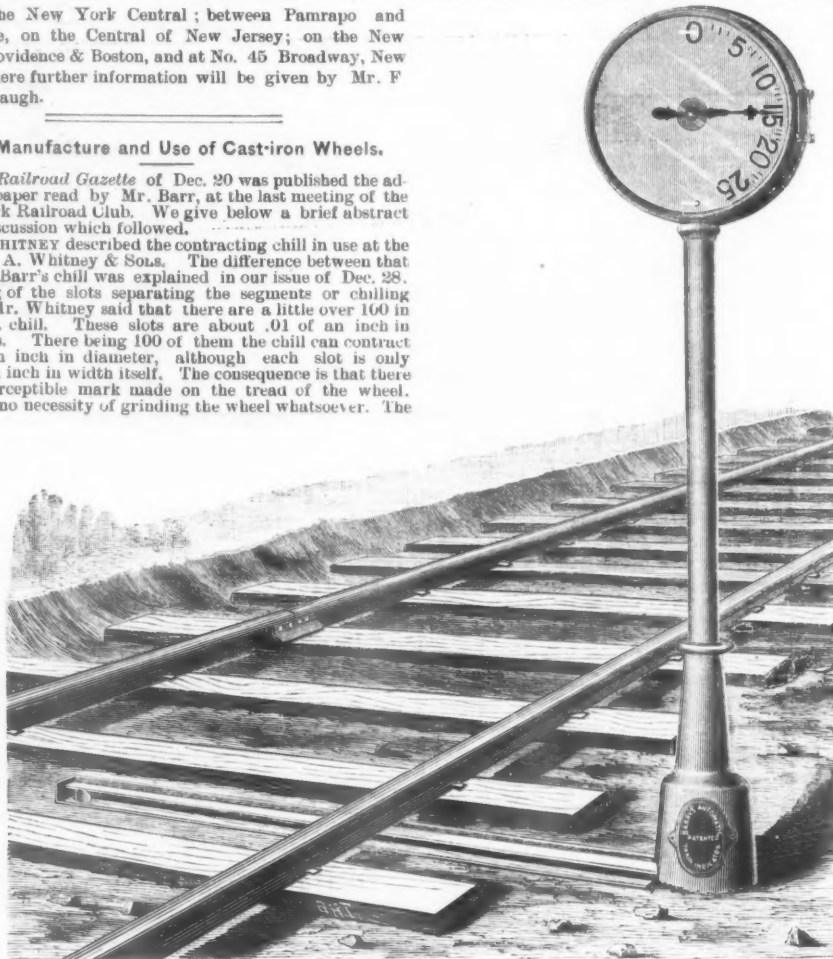
"Our engineers claim that they are almost invaluable as an extra safeguard against rear collisions; they feel much safer when running in the vicinity of these signals dark nights or in dense fogs or smoke, especially going down grades with heavy trains." Mr. Brown will show the signals to any one desiring to see them work. They can also be seen at Reading Highlands, on the Boston & Maine; at Orange, on the Delaware, Lackawanna & Western; at Spuyten Duy-

vil, on the New York Central; between Pamapo and Greenville, on the Central of New Jersey; on the New York, Providence & Boston, and at No. 45 Broadway, New York, where further information will be given by Mr. F. W. Coolbaugh.

#### The Manufacture and Use of Cast-iron Wheels.

In the *Railroad Gazette* of Dec. 20 was published the admirable paper read by Mr. Barr, at the last meeting of the New York Railroad Club. We give below a brief abstract of the discussion which followed.

Mr. WHITNEY described the contracting chill in use at the works of A. Whitney & Sons. The difference between that and Mr. Barr's chill was explained in our issue of Dec. 28. Speaking of the slots separating the segments or chilling blocks, Mr. Whitney said that there are a little over 100 in his 36-in. chill. These slots are about .01 of an inch in thickness. There being 100 of them the chill can contract nearly an inch in diameter, although each slot is only .01 of an inch in width itself. The consequence is that there is no perceptible mark made on the tread of the wheel. There is no necessity of grinding the wheel whatsoever. The



BARRY'S AUTOMATIC TRAIN INDICATOR.

wheel is perfectly smooth, as smooth as if made in an ordinary chill, and it is free from blemish.

I can corroborate what Mr. Barr says in the matter of pouring hot and fast. It makes a much better wheel in every respect. The chills we have had in use over two years ago, are to-day just as accurately round as the day when they came off the mill in which they were turned. I do not think they are  $\frac{1}{8}$  in. if they are that much, out of round—any one of them. In inspecting wheels for the Pennsylvania Railroad one testis to put a ring over the tread of the wheel, so that it shall bear evenly on the cone all around the wheel. You can go into our yard any day and take any wheel at

random from the yard and put such a ring on it, and you cannot put a visiting card in between the ring and the wheel in one in a hundred wheels. We have found the chilled wheel nearer to being accurately round than the steel-tired wheel which had just come off the lathe, and it will be generally so. We are now furnishing the Pennsylvania Railroad Company some thousands of wheels. From Oct. 5 to Dec. 18 they inspected 3,144 wheels. Of those, nearly 1,700 were of exactly the same circumference—not a sixteenth of an inch variation in them. Of the 3,144 wheels inspected, 941 varied one-eighth of an inch in circumference on the other side. Out of that 3,144 wheels,



in 2,638 the extreme variation was not more than one-fourth of an inch in circumference, so that we are perfectly willing to take a contract to furnish any railroad company with 1,000 wheels, or 10,000 wheels, of exactly the same circumference.

The depth of a chill upon a wheel, according to my experience is due very much to the thickness of the chilling surface. If your chilling surface is one-eighth of an inch thick, you will not get very much chill on your wheel. If it is, however, an inch thick you will get a deeper chill.

The question to-night is the proper wheel for a 60,000-lb. car. My own judgment has been for many years that a very much heavier tread of wheel is required for the service which is now exacted from railroad companies. You are having a steel tired wheel the thickness of which is  $2\frac{1}{2}$  in., put upon a centre of  $1\frac{1}{2}$  in. thick at least to bear the blows and hammering of a heavy load. Now you put under your 60,000-lb. car a wheel with a tread  $1\frac{1}{2}$  in., or a  $1\frac{1}{4}$  in. thick to stand the same blow. Your anvil is too light for the forging you are making upon it. You want a wheel of heavier tread, and I am very glad to see that one of the railroad companies in New England has realized that sufficiently to stipulate that the wheels that are made for them shall have a tread 2 in. thick. The difficulty in making such a wheel heretofore has been the expansion of the tire from the wheel, and the contraction of the wheel from the chill. With the contracting chill, if you have body enough of metal in the chilling surface to keep up the chill, you can make any thickness of tread that you please.

Mr. BARR: In reference to the matter of the metal solidifying a quarter of an inch in 10 seconds, I have, I suppose, made 100 tests of that by pouring a block of metal against a chill and removing the chill in 10 seconds. And I simply say that unless my eyes deceived me and my rules belied itself, what I said is correct without the least matter of theory about it.

Mr. LOBDELL: I have not the least doubt of it. I have often had a wheel when half full run out and leave a chilled crust of a quarter of an inch or more in thickness. I have had a wheel to run out just as it was full, and it would leave the entire straight flange, all of a certain thickness.

I doubt if Mr. Whitney's chill meets the contraction of the wheel to any degree, and as for the roundness of the wheel—we have had probably from 40,000 to 50,000 wheels inspected by the Pennsylvania and our inspectors during the past year and a half, and they have never discovered a wheel that was over one-sixty-fourth of an inch out of round. We have no trouble with the sweating of the flange of the wheel.

Mr. HILDRUP: As to Mr. Whitney's remark that the treads are too thin, too light. They are, but all car wheel makers of experience, I think have found that one very important thing in a car wheel was to balance it in annealing. A two and a half inch chilled tread attached to a three-quarter inch plate by all the processes of annealing that I know of would be very difficult to balance in the annealing when it came to the end. Iron expands with heat and contracts with cold. We all know that a wheel made without annealing is no wheel at all; that is, it is a broken casting as a rule. We all know that it takes a great while longer for two inches and a half of iron to cool, than it does for three-quarters of an inch, and especially when it is in such a position that air gets at both sides with free access on the three-quarter inch plate, and it is protected on the inside of the two and a half inch tread. What would be the benefit of a two and a half inch tread? Do you want any more material there than what is sufficient? Do car wheels break through the tread?

Mr. LOBDELL: Yes.

Mr. HILDRUP: Rarely. They break under certain conditions when exposed to violence. But the Pennsylvania Railroad in the wheel adopted for a 60,000-lb. car have a tread the thickest point of which is  $1\frac{1}{2}$  in. They enlarged that wheel during this past year  $\frac{1}{4}$  of an inch, and they are men who have had large railroad experience. To meet the wants of a 60,000 lb. car, a  $2\frac{1}{4}$ -in. tread might be better, but I don't see it.

Mr. WHITNEY: But the main point [in making a chilled wheel] is that the chill shall be kept in contact with the wheel until the full chilling effect is produced. After that you may take the chill away. If you will cast a sample block against a chilling block of iron and in ten seconds or less move it back from the iron, the heat of the molten metal will draw that chill out, there is no question about that. Take a block of iron and put a sample against it of any size you please, and let it lie there a few seconds, and a chill will be produced upon that sample of iron. If you run a thin knife blade down between that sample and the chill within ten seconds after it is poured, you will find that the chilling effect on that sample will be very materially reduced. In some irons it will be almost entirely removed. The heat of the sample, which has not yet solidified, will draw out the chill which has been produced in the first place. Now if you can keep the chill in contact with the wheel as long as required to produce the full chilling effect you have accomplished all that is necessary.

Some time ago I made some experiments with Saulsbury iron. I found the shrinkage of that iron was 0.16 of an inch in a foot. That is the natural shrinkage of the iron. I cast two wheels out of that Saulsbury iron. One was cast in an ordinary chill, the other was cast in the contracting chill. The ordinary chill when cold measured in circumference 98.75 in. The wheel cast in it when it was cold measured 95.625 in. The Saulsbury iron shrank 0.16 of an inch in a foot. Carrying that out to the circumference it made 1.3 inches in the circumference. If there had been no expansion in the chill the wheel ought to have been the full size of the chill, less the natural shrinkage of the iron. Or, minus 1.3 in., the wheel should have been 95.45 in in circumference, but it was actually 95.625. It was larger than it ought to have been with the natural shrinkage of the iron. The explanation of that is that the chill expanded before the wheel solidified. When the wheel solidified, it solidified to the chill, which measured more than 96.75, and the natural shrinkage of the iron brought it down to 95.625.

Now in the contracting chill we had this result. The circumference of the contracting chill was 96.625 in. when it was cold. The wheel cast in it measured 95.25 in. Now, if the wheel had simply had the shrinkage of the iron the wheel should have been 96.625 in., minus 1.3, or 95.325; it should have been a larger wheel than I got. My wheel was smaller than the natural shrinkage of the iron. These segments had moved in and the chill was actually smaller in diameter when the wheel solidified than 96.625. It is perfectly evident that as the wheel was smaller than it ought to have been by the actual contraction, the chill remained in close contact with the wheel during the whole process of the chilling.

We inspect our wheels with a chisel—a very highly, finely tempered chisel which is used with a good deal of skill and care. A man that is accustomed to using that chisel may be blindfolded and you may place before him half a dozen wheels made in an ordinary chill and half a dozen made in a contracting chill, and he will pick out every wheel made in the contracting chill by the difference of the cut. The metal is so much more dense that the chisel will tell it instantly to a man who knows how to use the chisel.

Taking the specific gravity of two specimens of chilled iron, the one made in the contracting wheel will be from 1 to

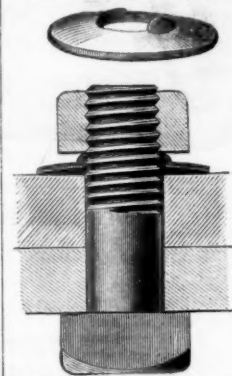
3 lbs. heavier per cubic foot than the specimen made in the ordinary chill. The density of the metal is tested by the specific gravity, and that is an absolute test. It is from 1 to 3 lbs., according to the iron used.

Mr. CHAPIN: For the past 10 years I have been interested in a foundry that has made in that time a quarter of a million wheels, with the old style chill. We have never been free from out of round wheels, or blow holes, slag, wrinkles or chill cracks. In the last year we have been using some of Mr. Barr's contracting chills and do not know how to make a wheel with any of these defects. We are pouring our wheels in 10 seconds. The mold does not stop to cool his iron at all, but pours it into the mold just as soon as he receives it. Last month four molders using the Barr chill did not, all told, lose as many wheels as the chill cracks of the fifth molder using the old style chill. Our experience with the Barr chill is, that we cannot make a wheel which varies in chill. We have been all through the Erie and Pennsylvania specifications and tests within the last two years, have had wheels made in old style chill rejected for a thirty-second and sixty-fourth part of a quarter of an inch chill in the neck of the wheel, although at times it would almost have taken a microscope to find the defects which caused the wheels to be rejected.

In further discussion Mr. Adams, of the Boston & Albany, said that a very large percentage of the wheels found broken on that line break in the plates—from 95 to 98 per cent., probably. As is well known, the road has long and heavy grades. The greater part of the wheels so broken are found at the foot of a 20-mile grade. Mr. Barr said that from his experience at Altoona he was ready to say definitely that 99 per cent. of the wheels broken on the line between the double and the single plates are broken from the bent caused by the use of brakes. He had run a car fast for a mile with brakes on and developed a crack in a perfectly good wheel. Mr. Garstang also spoke of this fact.

#### Improved Lock Washer.

We have previously shown the split lock washer made by the National Lock Washer Co., of Newark, N. J., for track and car work and many other uses. That washer is now used largely by car-builders and in car repair shops. The improved washer here shown is for comparatively light work, say for bolts of  $\frac{1}{2}$  in. to  $\frac{3}{4}$  in. for use on wood or metal. It will be seen that the inner edge of the dished washer has two projections, which are spirally inclined in the opposite direction from that of the threads on the bolt. By this arrangement these projections perform the displacing function upon the metal of the nut as the latter is screwed home. The pressure with which the dished washer bears



upon the surface of the work diminishes while the nut is being screwed on, and there is a diminished tendency of the edge of the washer to indent itself into the wood. The importance of this point will be readily appreciated. The smaller engraving shows a top view of the washer, with the projections clearly defined. The larger of the cuts represents a washer in position, with the nut ready to be screwed down upon it. From the engraving it can be understood with little difficulty just what will happen when this is done. The washers have given excellent results since their introduction.

#### The Ship Channel Between Montreal and Quebec.

As far back as 1825 the shipping that sought the harbor of Montreal was embarrassed by an insufficient depth of water in Lake St. Peter, which was only 11 ft. deep on the "flats" at low water. In the autumn of that year Montreal merchants caused a survey of the lake to be made, and the nature of the bottom having been found favorable, they petitioned the legislature in the following February for a grant to be expended in deepening the channel. This petition led to an investigation, which, however, resulted in no improvement in the channel, and a like result followed many subsequent petitions until 1884 when dredging was begun.

Before beginning the work there was considerable discussion as to the channel to be adopted through Lake St. Peter. The natural deep parts of the lake, with the "flats" or shallows intervening, formed a circuitous channel. Some advocated adopting this route and cutting a channel through the "flats" to join the deep pools, while others favored a straight cut, independent of the deep water pools. The Board of Works adopted the straight channel and carried on dredging in it during four seasons, viz., 1844 to 1847. This work was done principally on a bar at the upper end of the lake, and had scarcely reached the "flats" proper which were common to both channels, so that, although the upper bar had been cut through, no available increase of depth had been secured through the lake. Opposition to the straight channel had been increasing and resulted in the suspension of the work in 1847, after \$350,000 had been expended. Nothing further was done until 1851, when the Harbor Commissioners of Montreal, to whom the prosecution of the work had been transferred in 1850, began to dredge on the "flats" in the natural or circuitous channel. In November of that year a test showed that 2 ft. had been added to the natural depth. In Aug., 1853, 4 ft. had been gained. In 1855  $5\frac{1}{2}$  ft. had been added to the natural depth by dredging in Lake St. Peter and other shallow places, giving a channel  $18\frac{1}{2}$  ft. deep at low water, up to Montreal. In 1858 a depth of 18 ft. at lowest water was reached, and in 1865 a channel 30 ft. deep and 300 ft. in width was secured, and this was then deemed sufficient for the trade. But the increase of traffic and the increase in the draft of ships more than kept pace with the improvements, and scarcely was the new channel in use

when a demand arose for still greater depth. The subject was agitated for several years, and in 1873 means were secured for prosecuting the work. Dredges and tugs were built in 1874, and the further deepening of the channel began in 1875. The aim now was for 25 ft. depth, the first step being to deepen to 22 ft., which was accomplished in 1878, and in 1882 the 25-ft. ship channel was opened. It was then decided to continue the deepening  $2\frac{1}{2}$  ft. further, and the  $27\frac{1}{2}$  ft. channel was finished, and opened on the 7th of November, 1888.

The commercial results of this work may be judged from the fact that the ocean tonnage of the port of Montreal, which in 1840 was 58,099 tons, had increased fourteen-fold in 1887, when it reached 870,773 tons. In Lake St. Peter, in 1850, vessels drawing 11 ft. went fast aground at low water, and 500-ton vessels could scarcely carry enough cargo to enable them to stand upright, whereas in 1888, at the official opening of the  $27\frac{1}{2}$  ft. channel, three steamships, fully loaded, aggregating over 13,000 tons, and representing three steamship lines, met and passed at full speed, thus exemplifying the great growth of shipping that has followed the improvements so closely.

The engineering features of the work have special interest. Here river dredging has grown from babyhood to maturity, on lines parallel with its growth elsewhere, but independently and from original designs by the chief engineer of the trust, to meet the special requirements of the case, and which have raised dredgers of ordinary capacity to be machines of almost unprecedented efficiency. As an example of this, the reduction of the cost of dredging in Lake St. Peter may be taken. In 1832 the machinery of a bucket and ladder elevator dredge was imported. In 1840 this was fitted up in a hull, but the vessel was found quite inadequate to dredge in the hard bottom of the harbor. After repeated repairs she was sent to Lake St. Peter, and the work she did there from 1844 to 1847 cost about 40c. per cubic yard. By improved methods of handling the dredge, the cost was reduced in 1851-52 to 10 $\frac{1}{2}$  cents per cubic yard. This was further reduced by improvements in the scows and machinery to 5 $\frac{1}{2}$  cents in 1878, and by further improvements in the buckets to 3 $\frac{1}{2}$  cents in 1881, and still further, by a set of buckets specially designed for the material, the cost was lowered to 2 $\frac{1}{2}$  cents per cubic yard in 1886. This means more than the simple figures indicate, for in 1844 to 1847 and in 1851-52 the depth in which dredging was done varied with the season from 13 ft. to 20 ft.; in 1878 from 22 ft. to 33 ft.; in 1881 from 25 ft. to 35 ft., and in 1886 from  $27\frac{1}{2}$  ft. to 40 ft. Again, in the early days, the practicability of deepening clay bottoms was problematical in a river of such extent and current as the St. Lawrence, and dredging rock had not been thought of, whereas for several years past bedded shale rock has been regularly dredged with Kennedy's patent sold cast-steel buckets, at an average cost of 20-8-10 cents per cubic yard, in 25 ft. to 42 ft. depth and a current at ebb tide of six miles per hour.

The width of the "flats" is about four miles, but as the deepening progressed the area of dredging increased until for the  $27\frac{1}{2}$  ft. channel it extends over 40 miles in length, including materials of the various classes of soft and stiff blue clay, clay and gravel, sand, boulders bedded in clay, cemented materials of the most tenacious description, closely packed boulders, and solid shale rock. Some of the cemented material with imbedded boulders has proved more costly to dredge than the solid rock.

The work has been executed from the beginning by plant owned by the government or Commissioners, and directly by days' work under the immediate supervision of officers appointed by the government or Harbor Trust. Until 1850 the work was carried on directly by the Board of Works. From 1850 until 1887 it was prosecuted by the Harbor Commissioners of Montreal, who were authorized to raise the necessary funds by the issue of bonds, the interest on which, together with a sinking fund, was to be provided by a tax on the shipping entering the port of Montreal. In the beginning of the present year the debt was assumed by the Parliament of Canada, and the ship channel made a part of the public works of the Dominion.

#### Conference of Railroad Presidents and Bankers.

A second conference between the presidents of the railroads west of Chicago and St. Louis and representatives of leading banking houses was held in New York City, Jan. 8. At the previous meeting in December, it was agreed that rates should be restored on Jan. 1 for sixty days. It was expected that in the mean time a reasonable plan for the permanent maintenance of rates would be presented. The second meeting resulted simply in the appointment of a committee to confer with the Inter-state Commerce Commission about legal questions. The committee consisted of C. F. Adams, President of the Union Pacific; F. S. Bond, Vice-President of the Chicago, Milwaukee & St. Paul, and W. B. Strong, President of the Atchison, Topeka & Santa Fe.

All the roads in the territory involved were represented except the Chicago & Alton and the Wabash. The following announcement was made by Drexel, Morgan & Co. Tuesday evening:

An adjourned meeting of the presidents of the roads west of Chicago and St. Louis, together with members of the firms of Drexel, Morgan & Co., Brown Bros. & Co. and Kidder, Peabody & Co., was held this morning. In furtherance of this a committee was appointed to prepare the necessary papers; also to confer with the Inter-state Commerce Commission as to the legalities of any plan that might be prepared, said committee to report at the adjourned meeting to be held on Thursday [Jan. 10]. The presidents were also unanimous in the expression of the necessity of a strict enforcement of the Inter-state Commerce Act. A unanimous



invitation was extended to the trunk line presidents to join and take part in the conference on Thursday.

The motion to invite the trunk lines to join in the movement was made by Marvin Hughitt, Second Vice-President of the Chicago & Northwestern. There was no discussion of the reported quarrel between the Missouri Pacific and the Rock Island about the cutting of passenger rates west from Kansas City.

#### Improved Emery Wheel Tool Grinder.

The Springfield Glue & Emery Wheel Co. is at present turning out a new and improved form of grinder, which possesses many advantages for all uses to which this important tool is put.

As will be seen by the accompanying illustration, it is a heavy and substantially built machine, capable of doing the heaviest work with little vibration, the base being sufficiently flaring to give it a good foundation on the floor.

The tank for receiving the water as it comes from the wheel is placed inside the iron frame work, and this also catches the waste emery as it is ground off. This tank can be easily withdrawn, when necessary to empty it. The overflow from the tank is taken away by means of a siphon, the entrance to which is far enough below the surface of the water to prevent its collecting any oil or scum, and the water is drawn into another tank below, to which is attached a centrifugal pump, arranged for carrying the water back upon the wheel, and the flow is regulated by means of valves.

The water is conveyed to the wheel through a small opening on the under side of the spreader, which is of brass, and so arranged as to distribute the water evenly over the surface of the wheel. The tanks are out of sight, and the pump connection with the lower tank only leaves the upper tank free from pipe connections, so that it can be readily emptied without having to make connections. The table is pitched toward the centre sufficiently to prevent any water from standing upon it.

It has self-oiling bearings 8 in. long. The spindle is 2½ in. and made of steel, capable of carrying a wheel 36 in. in diameter and 4 in. thick, with a 24 in. hole. Large collars hold the wheel in position. Owing to the large hole, there is no wheel hub or centre to be thrown away after the wheel has been worn out. By the arrangement of the collars the wheel can be quickly and easily removed and another substituted.

The rapid increase in improved methods of emery grinders is an object of considerable consequence to users of the tool, and the above machine presents features that are certainly desirable and worthy of consideration.

#### A Car-heating Test.

There has been considerable discussion regarding the safety of passengers in a train heated with direct steam from the engine in case of bursting pipes. To ascertain what this amounts to, a test was made at the Old Colony yard, in South Boston, on the 5th inst. There were present the Massachusetts Board of Railroad Commissioners, Professors Lanza and Swain, of the Massachusetts Institute of Technology, and Mr. J. N. Lauder, Superintendent of Rolling Stock of the Old Colony.

The experiment was made with an engine and one car piped with the Sewall system. A globe valve, with opening the full size of the train pipe (1½ in. diameter), was placed in the centre of the car, and a wire attached, with which to, open the valve from the outside of the car.

The first test made was with a pressure of 20 lbs. of steam which was finally increased to 80 lbs. While the steam was escaping at the pressure of 80 lbs. the gentlemen present remained in the car. Mr. Crocker, Chairman of the Railroad Commission, sat in close proximity to the place in the pipe where the steam was escaping. The only result was to fill the car with vapor, and across the aisle, directly opposite to the valve, the heat was not sufficient to burn a person's ankles seated there. The varnish in the car was not even turned white by the escaping steam.

Those who witnessed the experiment were satisfied that the danger to passengers from escaping steam would be very slight.

#### TECHNICAL.

##### Locomotive Building.

The Housatonic is to have built two Mogul freight and two passenger locomotives. They will burn hard coal, and the latter will be used on the limited express.

The Cooke Locomotive Works, of Paterson, N. J., have completed a Leslie rotary snow shovel for the Chicago, Rock Island & Pacific. They have orders for seven more of these shovels.

##### Car Notes.

The Seattle, Lake Shore & Eastern has, during the last year, received or built 210 flat cars and 55 box cars fitted with the new Westinghouse brake. These are in addition to other equipment not so fitted.

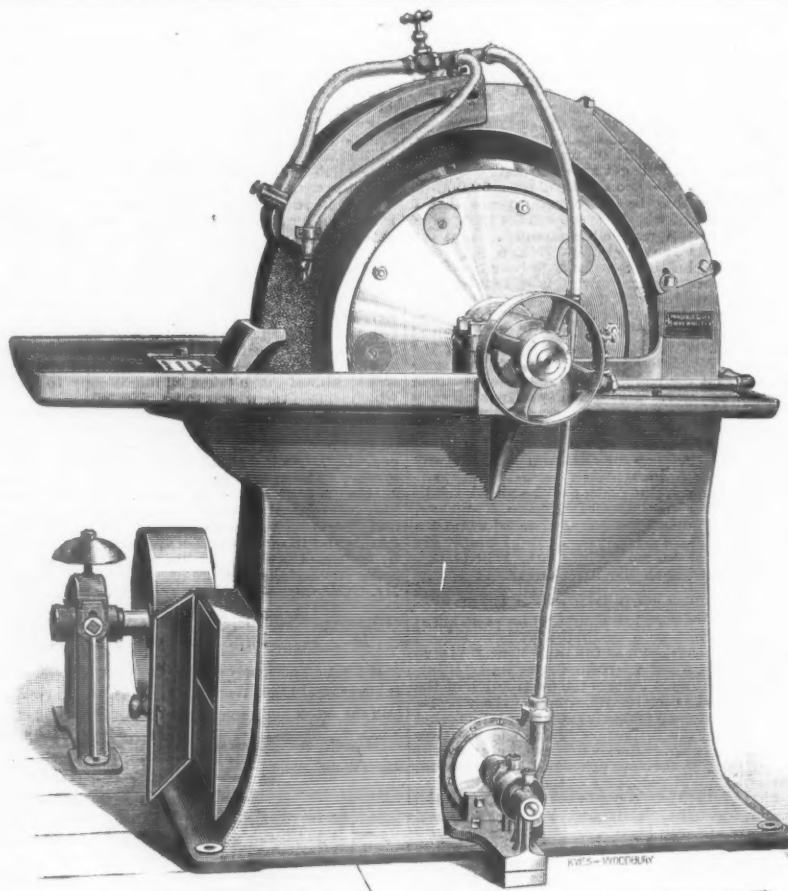
The Ohio & Mississippi is building a number of 70 ft. baggage cars at its shops at Cochran, Ind.

The Kansas City, Fort Scott & Memphis increased its equipment last year by the addition of 680 freight and 8 passenger cars. Of the freight cars 80 were built in the company's shops.

The Anniston Works of the United States Rolling Stock Co. have completed 40 of the 60 coke cars ordered by the Alabama Great Southern.

The St. Charles Car Co., of St. Charles, Mo., has secured a contract from the Chicago & Atlantic for building 10 baggage cars, and also a contract from the Toledo, Ann Arbor & North Michigan for two parlor cars.

The Ellis Car Co., of Amesbury, Mass., has recently completed a large shop, 200 ft. long by 60 ft. wide and three



EMERY WHEEL TOOL GRINDER

Made by the SPRINGFIELD GLUE & EMERY WHEEL CO., Springfield, Mass.

stories high for the manufacture of street cars. The company has now ready for furnishing 10 box cars and has under construction 15 open and 10 box cars. Several new features in the construction of street cars will be embodied in these cars, the most important of which will be a new ratchet brake recently patented by the Superintendent Mr. Gardner. The cars will be equipped with Vose springs and Bemis journal boxes. The company will also probably build steam cars, as their plant is an extensive one and they are fully equipped for doing the work.

The Muskegon Car Co., of Muskegon, Mich., is working on a contract to build 500 cars for the Chicago & Atlantic road. This, with other contracts which the company has, will keep it busy all winter.

The Indianapolis Car Mfg. Co. built last year a total of 4,620 cars. The average number of men employed was 480. In the construction of the cars 15,000,000 ft. of pine and oak lumber, and 18,480,000 lbs. of wrought iron were used. In the wheels there were 4,800 lbs. of castings to each car, and the axles for each car weighed 1,600 lbs. In addition to the new work turned out, a large amount of repairing to line cars was done. The foundries turned out an average of about 40 wheels a day above what were used by the works.

The Carlisle Manufacturing Co., of Carlisle, Pa., has elected officers as follows: President, J. Herman Bosler; Vice-President, William R. Line; Treasurer, L. F. Bower; Secretary, W. W. Dale; Directors, J. Herman Bosler, George S. Beetem, J. N. Choate, Dr. W. W. Dale, F. Gardner, John Hays, W. T. Horn, W. R. Line and L. M. Myers. The Cincinnati, Hamilton & Dayton will, it is reported, soon be in the market for 300 box cars and 100 stock cars. The Lafayette Car Works are now delivering 100 refrigerator cars to the road.

The Erie Car Works is engaged on a contract for 100 cars for the New York, New Haven & Hartford, which are to be completed at an early date. These cars are designed to be used as express cars at times and be made up in passenger trains, and will be supplied with passenger trucks and air brakes.

##### Bridge Notes.

The Philadelphia & Reading will build, at its own expense, a substantial bridge for the use of the public over the railroad tracks in the West Park, Philadelphia, which will do away with a grade crossing.

The following proposals for building a wrought-iron bridge over the Erie Canal at West Troy, N. Y., in connection with other improvements at the Watervliet Arsenal were received: R. F. Hawkins, Springfield, Mass., \$6,393; Jacob Holler, Albany, N. Y., \$6,350; Vermont Construction Co., St. Albans, Vt., \$7,124; New Jersey Steel & Iron Co., Trenton, N. J., \$6,364; Mount Vernon Bridge Co., Mount Vernon, O., \$6,500; King Iron Bridge Manufacturing Co., 7,112; Elnathan Sweet, Albany, N. Y., \$34,900; Berlin Iron Bridge Co., Berlin, Conn., \$6,412.

The two iron bridges across Wesley Lake, at Asbury Park, N. J., have been completed.

An iron bridge is to be built at West Fayette street, in Uniontown, Pa.

The Old Colony Railroad is building an iron bridge over School street, Quincy, Mass.

The new bridge over Rolling Fork at New Haven, Ky., is completed.

A petition will be presented to the next Maine Legislature praying for a bridge from Cape Neddick, York Harbor, to Ogunquit, Wells, Me.

Three bids for the construction of a superstructure of a bridge over the Erie Canal at Main street, Rochester, were received by the Superintendent of Public Works. The contract was let to the Hilton Bridge Construction Co., of Albany, for \$20,960.

Anderson & Barr, New York City, have been awarded the contract for building a draw-bridge across the St. Johns River at Jacksonville.

The building of a new iron bridge across the Susquehanna River at Harrisburg, Pa., to cost \$200,000, is being talked of in that city.

The Wisconsin Bridge & Iron Co. has just completed an iron bridge at New Berlin, Ill.

A new bridge will be built at Spring avenue, Troy, N. Y., next spring.

A new iron bridge is being built across Blackstone River at Blackstone, Mass.

#### Manufacturing and Business.

The Marion Steam Shovel Co. has opened a branch office at No. 52 Broadway, New York. Mr. F. J. Smith is Manager of the Eastern office. An agency has also been established at 159 La Salle street, Chicago, Mr. Jas. O. Wright Manager. It will be remembered that the company established an office in San Francisco last April.

Mr. A. W. Van Dorston has granted to the Timms Coupler Co. a license to use his patented coupler lines, and also his coupler cushion, which were illustrated in the *Railroad Gazette* Dec. 14, 1888.

The Berry & Orton Co. (formerly London, Berry & Orton) has the contract for the machinery of the works of the Minnesota Car Co., now being built at Duluth, Minn. Among recent contracts are the machinery for a wood working shop of the Baldwin Locomotive Works, and the entire plant of the new wood-working shop of Harlan & Hollingsworth, at Wilmington, Del.

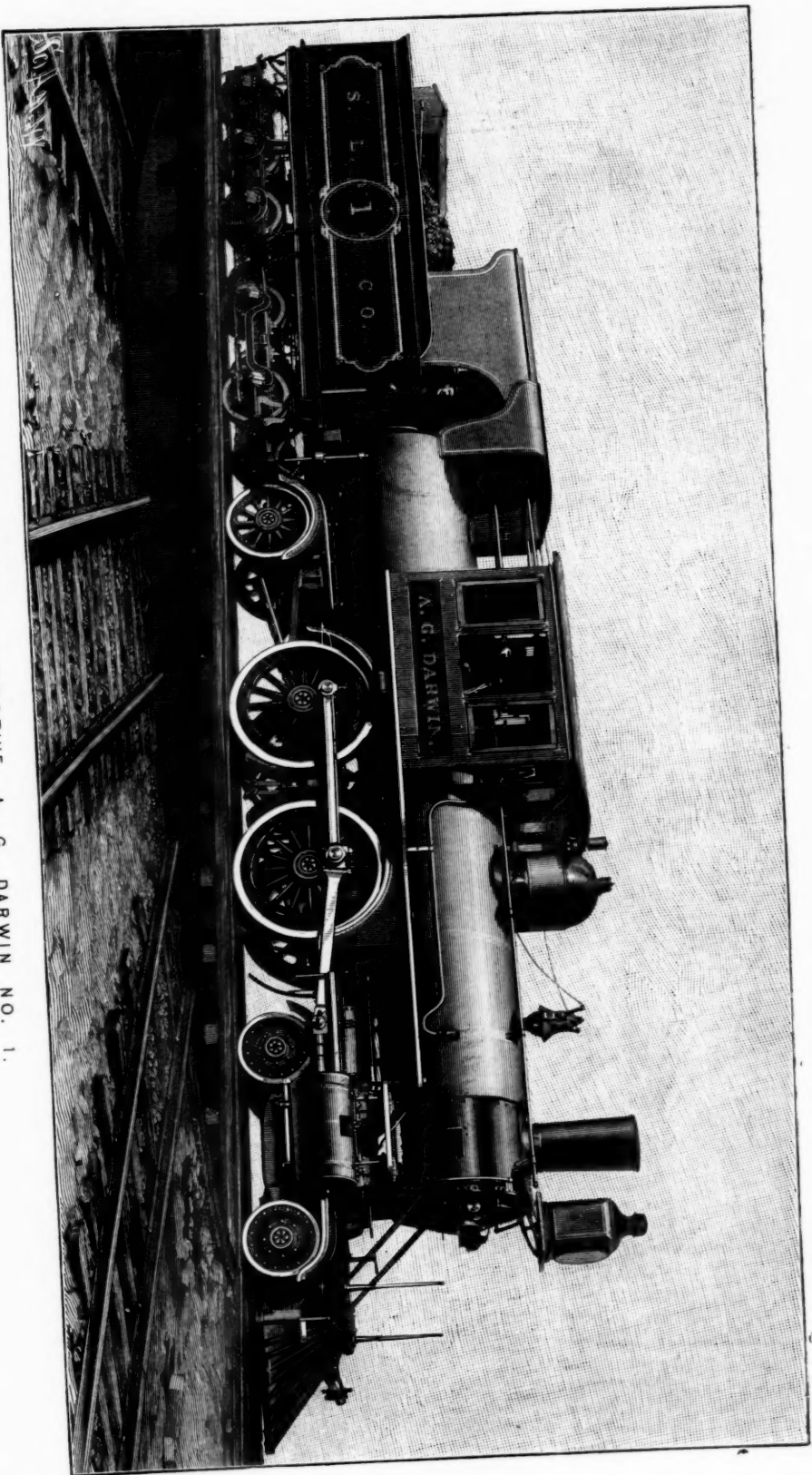
The Georgia Pacific will add more tools to its shops at Columbus, Miss.

The Keystone Construction Co., of Pittsburgh, has established a Chicago branch, occupying offices with Westinghouse, Church, Kerr & Co. This company will do exclusively construction work for the Westinghouse systems of electric lighting, co-operating with Westinghouse, Church, Kerr & Co. in their specialties. The Roney mechanical stoker, manufactured and sold by this company, is meeting with great success, among the contracts for it just closed being one for the equipment of the Spreckels Sugar Refinery in Philadelphia. The electric light plant at Cedar Rapids, Iowa, of the Westinghouse system has been completed.

Messrs. Riehle Bros., Proprietors of the Philadelphia Scale and Testing Machine Works, 8th and Master streets, report among others the following recent orders: One 100,000-lb. vertical testing machine to the Union Switch & Signal Co., Pittsburgh, Pa.; one ton of the United States standard testing weights to Woodstock Iron Co., Anniston, Ala.; also one ton testing weights to the State Line & Sullivan Railroad; one 50-ton self adjusting track scale with rocking bearings, to E. P. Allis, Milwaukee, Wis.; one 5,000-lb. foundry tester to Rogers, Brown & Co., Cincinnati, Ohio; one 5,000-lb. transverse testing machine, to United States Rolling Stock Co., Hegewisch, Ill.; one furnace charging scale, to Marion Iron Co., Conshohocken, Pa.; two Clarke patented ventilating fans to McNeely & Co., Philadelphia; one 100,000-lb. United States standard cement testing machine, to Rock Island (Ill.) Arsenal, U. S. A.; also one of 2,000 lbs. to the United States Quartermaster Department, Fort Riley, Kan.; one 4,000-lb. screw power testing machine, to the Nebraska State University, Lincoln, Neb.; one marble molding and counter sinking machine, to Battey, See & Eisele, New York; one coal hopper scale, to Manufacturers Club, Philadelphia; one 10-ton wagon scale, with platform 22 ft. long, to Haines & Thomas, Malvern, Pa.; one 6-ton scale, to W. A. Levering, Atlantic Heights, N. J.

The Okonite Co., of New York, Manufacturers of the "Okonite" insulated wires and cables, finds the demand for it





THE STRONG LOCOMOTIVE, A. G. DARWIN NO. 1.  
*Built by the Hinkley Locomotive Co., Boston, Mass.*







goods steadily increasing. The company has recently appointed the California Electrical Works, of San Francisco, Cal., its Pacific coast agents.

H. K. Porter & Co., of Pittsburgh, are making a light engine for display at the Paris International Exhibition, which opens May 5, 1889.

The Haines, Jones & Cadbury Co., of Philadelphia, announce the close of the second year of profit-sharing with their employes. Both the wages and capital engaged in the business for the year have been larger than for 1887, and while the aggregate profits have been nearly the same, the ratio of dividends is less. Each person who has worked the required length of time will receive for his share of the profits of 1888 a sum equal to 6½ per cent. of his total wages for the year. The total wages for 1888 amount to \$140,000, and the dividend to \$9,100. The plan of division for 1889 will differ materially from that used the past two years. No definite ratio for the division of profits will be promised for the coming year, but if in the judgment of the directors, the business for 1889 earns a profit above 6 per cent. interest on the capital, there will be a dividend to labor.

The Philadelphia & Reading has made a contract with the Harlan & Hollingsworth Co., of Wilmington, Del., for the construction of a large ferryboat, to be run from Walnut street, Philadelphia, to Kaighn's Point, Camden.

The Kentucky Improvement Co. has been organized at Louisville, Ky., with a capital stock of \$500,000, by F. D. Carley, President of the Kentucky Union Railroad, and others. The company will deal in railroad supplies.

Since Jan. 1, the storm-proof door of the Dunham Manufacturing Co., of Boston, has been ordered by the Cleveland, Columbus, Cincinnati & Indianapolis, the Wabash, Central of New Jersey, Union Pacific, Chicago, Burlington & Quincy, and the Milwaukee, Lake Shore & Western roads.

The Mason Regulator Co., of Boston, has just received a diploma of excellence granted its reducing valve by the commission appointed at the recent national exhibition held in Copenhagen.

#### Iron and Steel.

The Waugh Steel Works, of Belleville, Ill., are manufacturing steel rails, billets, etc., and have also recently commenced the manufacture of steel shafting of all the different sizes, besides squares and flats. The company also manufactures all sizes of steel rails from 12 lbs. to 35 lbs.

The Montreal Rolling Mill Co., of Montreal, Can., will enlarge and improve their mills.

It is proposed to establish a brass rolling-mill at Attleboro, Mass., similar to the mills at Waterbury, Conn.

The extensive foundry of the Reading Foundry Co., in Reading, Pa., where large iron pipe is made, has closed down indefinitely.

The St. Louis Ore and Steel Co., of St. Louis, Mo., is preparing to restart its blast furnaces, and may follow with the steel works, though that has not yet been definitely decided. The company has, it is said, over 100,000 tons of ore at its Pilot Knob mine.

The North Chicago Rolling Mill Co. has one of its North Chicago furnaces in blast on speigleisen with satisfactory results. It has been in operation over three weeks, and produces about 600 tons per week of 30 per cent. metal. The ores used are from Batesville, Ark. A small quantity of speigleisen has been made heretofore in a few furnaces in the West as an experiment, but this is probably the first time of the manufacture of speigleisen on a considerable scale in the Western States.

The American Association, Limited, is said to be considering the proposition for the erection of an 80-ton iron furnace at Middlesborough, Ky., and is organizing a stock company to build four other furnaces.

W. H. Blakey, formerly with W. H. Walbaum & Co., and G. D. McLellan, from the house of James Watson, of Glasgow, have formed a partnership as Blakey & McLellan, and will do a general iron business as agents for James Watson. The offices will be in the Bullitt Building, Pittsburgh.

The annual meeting of the Indianapolis Rolling Mill Co. was held in that city last week, and the following officers were re-elected: Aquilla Jones, President; John Thomas, Secretary; Stephen W. Morgan, Superintendent. Nothing was done of a definite nature concerning the future use of the rolling mill.

M. V. Smith, Metallurgical Engineer, of Pittsburgh, is constructing several new rolling mills in different parts of the country, including the mill for the Minnesota Car Co., at Duluth, Minn.; the mill for the Standard Spike Co., at Manchester, Va., and the mill for the Union Steel & Iron Co., at St. Joseph, Mo.

The works of the Scranton Steel Co. have been closed for three weeks. New cranes and other new machinery will be put in, which will greatly add to the facilities now possessed by the company for turning out steel rails.

The Reading Iron Works, of Reading, Pa., has recorded a mortgage for \$600,000 to a Philadelphia company. This is to take the place of one for \$1,000,000 executed in 1874, to the American Life Insurance Co., made payable this year.

The Vermilion & Grand Marais Iron Co. has been organized, with headquarters at Duluth, Minn., with a capital stock of \$5,000,000. The incorporators are Hiram W. Sibley, New York; Henry M. Loud, Oscoda, Mich., and others. The company owns lands on the East Vermilion and also the Messaba. The company has between 12,000 and 15,000 acres of land, containing many rich and very valuable iron outcroppings. Officers have been selected as follows: Henry M. Loud, President; M. Stewart, and W. McKinley, Vice Presidents; F. W. Paine, Treasurer, and Horace Williston, Secretary.

A dispatch states that the Victoria iron furnace and mines at Goshen, Va., which have a daily capacity of 200 tons of iron, have been leased to Chamberlain, Wheeler & Co., of Columbus, O.

#### The Rail Market.

**Steel Rails.**—The market is dull, with quotations at \$28 at Eastern mills, and but a few sales, for Southern delivery at private terms, are reported.

**Old Rails.**—No business is reported, and quotations remain nominally at \$23@23.50 for tees.

**Track Fastenings.**—Spikes are quoted at 2.10@2.15c. and angle bars at 1.85@1.9c. delivered.

#### The Eiffel Tower.

A despatch of the 9th inst. from Paris states that the Eiffel tower has reached the height of 225 metres, 761 ft.

#### The Sewall Car Heating Co.

An important change has been made in the Sewall Car Heating Company, Mr. A. Gunnison having withdrawn from the presidency. The New York office is abolished. The principal office of the company is now at Portland, Maine, and the Western office at 311 Phenix Building, Chicago, in

charge of Mr. James H. Sewall, the mechanical superintendent of the company. This change dates back some few months.

#### The Output of the Baldwin Locomotive Works.

During the year 1888, just closed, the Baldwin Locomotive Works, of Philadelphia, largely exceeded their previous largest output, the number for the year being 737. Of these, two were of special type, one being a handsome special locomotive and car combined for the government of Nicaragua, and one a rack-rail locomotive for a Brazilian railroad, having maximum grades of 83½ per cent., or one foot rise to every three of length. One hundred and eighty-eight engines had two pairs of driving-wheels coupled, 277 had three pairs of driving-wheels coupled, and 272 were of the consolidation type, with four pairs of coupled wheels. The latter included two locomotives of unusual size for the Oregon & Washington Territory Railroad, having cylinders 21 by 28 in., and weighing in working order (exclusive of tender) about 135,000 each. Twenty-one larger engines of the same type were built for the Philadelphia & Reading, Central of New Jersey, and Northern Pacific railroads, their cylinders being 22 by 28 in., and weight in working order (exclusive of tender) about 150,000 lbs. each. One of these engines on the Northern Pacific Railroad has hauled a train of 600 tons weight up a grade of 116 feet per mile, with reverse curves. Ninety-three locomotives were exported to the following countries: Australia, Brazil, Canada, Central America, Cuba, Ecuador, Mexico and New Zealand.

Taking the average length per engine and tender at 45 feet, the year's output of 737 locomotives coupled together would make a train about six and a quarter miles in length, and under steam would weigh over 50,000 tons. The average size and weight per locomotive and tender are greater than in any previous year.

#### THE SCRAP HEAP.

##### Notes.

The new station which the New York Central & Hudson River will soon erect at Lockport, N. Y., will be one of the handsomest on the line of the road, with a main building 128 x 24 ft. It will be of Buffalo pressed brick, with light Medina gray sandstone trimmings, with a tower, slated roof, and old-fashioned chimney. The exterior will be of Moorish design, with dormer windows and porticos.

Division Superintendent A. B. Starr, of the Pittsburgh, Fort Wayne & Chicago, has been indicted by the Grand Jury at Pittsburgh, Pa., for negligence in connection with the killing of two passengers in a street car, which was struck by a locomotive about a year ago. It is held that he did not see that the rules were properly enforced, and was therein criminally negligent.

On the Cumberland Valley road the recent track inspection resulted in the giving of prizes to John Slonaker (first), Sebastian Shover (second) and John A. Solenberger (third). Mr. Slonaker distributed his money among his workmen.

The Missouri Pacific has made a reduction of 10 per cent. in the salaries of all employes paid by the month who receive over \$100 monthly.

A suit has been begun at Indianapolis against the Lake Erie & Western, claiming that certain farm lands have been damaged by natural gas explosions caused by heavy trains passing over the ground.

The Pennsylvania, which considerably restricted its "free list" on the passage of the Inter-state Commerce law, has now modified the order so that passes may be issued to the officers of river, lake, sound and ocean steamship lines that form routes of transportation in connection with the lines of the company; trip passes to the directors of other railroads traveling to and from meetings of boards upon request of an executive officer; trip passes to members of the immediate families of officers of other companies who receive exchange passes.

The Railroad Y. M. C. A., connected with the Grand Central Station, New York city, held its 13th anniversary meeting on Jan. 8, Presidents Dewey, Harris (Northern Pacific), Corbin and Layng being present. The average daily attendance at the rooms in the elegant building given by Cornelius Vanderbilt has been, during the past year, 358 in the winter and 308 in the summer. Mr. Vanderbilt, in his address as chairman, stated that there are now 93 organizations of this kind in the United States and Canada.

Gov. Thayer, of Nebraska, in his inaugural address disapproves the recommendation of the Attorney General that action be taken against the Union Pacific, and asserts that the laws of the state already control that and all other railroads.

A bill has been introduced in the Nebraska Legislature providing for laws regulating the railroads similar to those of Iowa.

Stealing brass seems to be the popular thing with thieves just now. At Jersey City and other points freight cars have been jacked up and the brass bearings taken out. At Altoona a very large quantity is said to have been stolen off the engines. Seventy-five boys are implicated, it is said, and four men have been arrested.

#### The Burlington Strike.

Vice-President Stone, of the C. B. & Q., joined with the committee of the Brotherhood in announcing last week that the strike "had been settled." Neither side gives any particulars. There is, however, no evidence that the road has made any concessions whatever. It has apparently agreed not to discriminate against its former employes when filling vacancies. A rumor, which seems to be more than usually reliable, has it that Mr. Arthur has resigned.

#### Highway Grade Crossings in Massachusetts.

The committee appointed to consider the question of the eventual abolition of highway crossings at grade, recently held a meeting at the Boston State House. Under the law creating the Commission a report must be made to the Legislature by Feb. 1.

President Choate, of the Old Colony, advocated the abolition of grade crossings, and said that the greatest obstacle in the way is the difficulty of a just division of the expenses. The towns strongly object to bearing any portion of them, and it is a question if the state should not assume a portion of the cost. The important grade crossings in the cities which are carefully watched are not the ones which need the first consideration. It would be preferable to abolish ten grade crossings in the country at a cost of \$10,000 each to doing away with two in a city at a cost of \$1,000,000. As a rule, towns are very unwilling to consent to a readjustment of the highway grades to facilitate doing away with crossings at grade.

Mr. Samuel Hear, of the Boston & Albany, hoped that no action would be taken by the Commission to impede the abolition of grade crossings. He believes that the principles on which this work should be done is, that the railroad should carry on the work on its own right of way, and the towns to work outside. This had been done in Springfield. He knew of no fixed rule for all cases, and considers that

each case should be treated by itself. The Boston & Albany is willing to do its fair share in this improvement.

Alderman Hincks, of Cambridge, thought that the state should be willing to pay a fair and equitable share of the cost of separation of grades.

Mr. Humphrey, of Weymouth, thought that the counties and state should bear some portion of the expense, this portion to be adjusted by the Commission.

Mr. J. T. Furber, General Manager of the Boston & Maine, did not believe in attempting to do away with grade crossings, and trusted that no law compelling such a change would be passed. He did, however, believe in a law being passed which should prevent the construction of new highway crossings at grade. Several citizens of various towns thought that their towns would be willing to bear part of the expense, but the Mayor of Newton thought that no one but the railroads, unless it may be the state, should be asked to assume any of the cost.

The following is from the message of the Governor of Massachusetts:

The means of securing the gradual abolition of grade crossings will be probably the most prominent and important subject for general legislation relating to railroads. The dangers attendant upon grade crossings are increasing every year, and the interruption to traffic in consequence of such crossings in the large cities is rapidly assuming serious proportions. Very full information upon the subject will be laid before you in the report of the Board of Railroad Commissioners, and also in the report of a board of three civil engineers appointed last year to make special investigation of this subject. I recommend that you give to this matter your early and careful attention. It will greatly redound to your credit if your legislation on this subject shall, while duly protecting all interests, prove to be effective in shortening the long account of loss of life, of suffering and of waste of time each year charged to our grade crossings.

#### Highway Crossings in Pennsylvania.

The following is from the message of the Governor of Pennsylvania:

Another subject, which concerns alike the interest of our railroads and the people in general, is merely mentioned and recommended to your consideration. It is the question of grade crossing. The protection of the lives of our people and of the property and treasures of our railroads demand that, however practicable, the grade crossings should be abolished. This is particularly true of cities. A bill which passed the last Legislature relating to this subject failed to meet the Executive approval because of the failure of the title to fairly indicate its contents, and, secondly, because it provided, among other things, for the proportion in which the damages resulting from the abolishing of grade crossings should be paid by the companies themselves and the cities to which the bill related. This provision seemed to be of doubtful expediency, even if it were entirely constitutional. It is hoped that some wholesome provision may be made by the present Legislature which will serve to introduce a wise system through which this check to traffic and danger to lives may be minimized and finally avoided.

#### The Pacific Cable.

This project is now at a standstill, waiting the outcome of the conference at Ottawa between the Australian and Canadian delegates. It is believed that if the conference shows that Canada and Australia are determined to establish a cable, public opinion in England will call for imperial support.

#### New South Wales.

The government of New South Wales has appointed Messrs. W. M. Fehon and C. N. J. Oliver as Commissioners of Railways, associated with Mr. Eddy. The former has been connected with the New South Wales railroads for some time as Traffic Manager, etc., and Mr. Oliver has been for many years Under Secretary of Lands in Sydney.

#### Indicted for Manslaughter.

Mr. W. J. Fay, President and General Manager of the Denver Gas Co., and a wealthy citizen of that place, has been indicted for manslaughter. He was superintending the work done by laborers who were killed by a cave-in in the construction of the cable road, a short time ago. The coroner's jury returned a verdict of criminal carelessness and the indictment followed. His foremen have also been indicted.

#### Shifting of the Bed of the Colorado.

The Atlantic & Pacific is having a good deal of trouble with the Colorado River between The Needles, Cal., and Powell, Ariz. In 1886 the bed of the river was some 10,000 ft. away from the railroad, but now it is cutting into the railroad embankment. During the summer of this year the river bed changed its position 3,000 ft. The present draw span has been left over dry land by the changes. The track is to be changed 1 from the east side to the west side of the river for some 10 or 12 miles, and the bridge 2½ miles east of The Needles is to be abandoned and another bridge built near Powell. Work on this bridge has begun. At several points dikes have been constructed to protect the embankment.

#### Foreclosures in 1888.

The *Railway Age* prints a table giving the names of railroads sold under foreclosure during the calendar year just closed. It includes 19 roads, with 1,596 miles and \$64,555,000 of bonds and stocks. The year's record is the smallest of the last four years. The number of roads placed under receivers by the courts during the past year is 22, with 3,270 miles of road and \$186,814,000 stock and bonds. These figures are much larger than those for either of the previous two years, but smaller than those for 1885 or 1884.

#### Coal Found in Dakota.

A St. Paul dispatch gives an account of the finding of a valuable coal deposit in Dakota. It is three miles north of Centerville. One vein 8 ft. thick was first bored into at a depth of 128 ft., and after going through sandstone and slate, another vein was struck in which the drill is now working. Anthracite coal was recently discovered near Chamberlain, Dak., but the extent of the vein is still unknown.

#### Railroad for British Honduras.

Our Consul at Belize has informed the Secretary of State that proposals have been invited for the construction of a railway in British Honduras. The bids will be opened April 3.

#### Proposed Conference of Railroad Commissioners.

Railroad Commissioner Cappeller, of Ohio, has received a letter from Secretary Moseley of the Inter-state Commerce Commission, proposing a meeting of the State Railroad Commissioners of all the states. The Commissioners "would be glad of an opportunity to make the personal acquaintance of the various members of the state commissions, and there are several matters connected with the administration of the law as applied to the regulation of the railway system of the country in respect to which unity of action and harmony of purpose among all those charged with such administration exceedingly desirable."





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#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The *Railroad Gazette* has established an editorial office in Chicago. The importance of the railroad interests centering there have long suggested such a step, and we now have the pleasure of announcing that Mr. David L. Barnes will occupy the Chicago office of the *Railroad Gazette*, as editorial writer and consulting engineer. His office is in The Rookery Building, where he will always be glad to see the friends and readers of this journal.

Judge Cooley's speech before the Boston Merchants' Association, from which we publish copious extracts in another column, deserves careful attention. It is hardly necessary to say that it is a strong and able account of the situation. From one point of view it is absolutely convincing. It leaves no room for doubt that the railroads ought to try to obey the law to the best of their ability, and that many railroad men are to blame for what has happened in the immediate past. This no sensible man denies. But a great many people, and we are among the number, think that the law in its present form hampers the better class of railroad men in their efforts, and is itself in no slight measure to blame for existing results; that the prohibition of pools has done harm which perhaps outweighs the good obtained from other parts of the act. These points do not seem to us to be fully met by Judge Cooley's address. He admits that the law is almost powerless without moral support. Now an essential difficulty of the act as at present understood is that it makes it very hard for the better class of railroad men to give it the moral support which is demanded. It has the effect of placing them at the mercy of their more reckless rivals. It deprives them of the means of self defense to which they have been accustomed, and offers nothing in its place. The Commission has declined to protect investors' interests. Under the circumstances, what are the railroad managers to do? They are bound to obey the law, because it is the law, if for no other reason; but it seems too much to expect a great deal of moral support in its execution. The Commission is seriously hampered by the fact that it is neither a court nor an advisory body, but something between the two. The Massachusetts Commission, 15 years ago, was advisory; it thus was led into a line of action where it had moral forces in its favor, and used them to the best advantage. During the first few months of the existence of the Inter-state Commerce Commission it enjoyed the same advantage. Judge Cooley lays stress on the fact that during the first few months of the operation of the act, when it was best obeyed, matters were most prosperous. But it must be remembered that during those months the Commission so administered the act that it was easier to secure the necessary support. The short haul clause was in many places allowed to remain unenforced. The extensive jurisdiction over rates which has more recently been assumed was not then thought of. The power to protect investors had not been disclaimed. The Commission was in a position to seek moral sup-

port, and it obtained it. But its subsequent actions made it more difficult to command this support. It assumed the attitude of a court, pure and simple, without really being in possession of a court's power to see that the law was enforced. A story is told of a noted English schoolmaster some sixty years since who expounded Scripture as follows: "Blessed are the pure in heart." Mind that, boys. The Bible says it's your duty to be pure in heart. If you're not pure in heart I'll flog you." Is this the way in which the Commission is going to expound the Inter-state Commerce law to the railroads?

Judge Jackson, of the United States Circuit Court, has reversed the decision of the Inter-state Commerce Commission in the case of *The Kentucky & Indiana Bridge Co. vs. Louisville & Nashville Railroad*. In itself the point affected is not one of any great importance. The case largely turned upon the question whether the Bridge company was a common carrier, to which the railroad was bound to afford the same facilities for interchange of freight as were furnished to other connecting lines, even at some inconvenience to itself. Defendant claimed that it was not; the Commission decided that it was. The Court has simply reversed the decision of the Commission. But there are other aspects of the case in which it has more importance. To begin with, it is the first of the Inter-state Commission cases which has been appealed. The question of jurisdiction was thus brought up for the first time. The Court holds that the Inter-state Commerce Commission has not final jurisdiction, and that its decisions are subject to review upon appeal to the Federal court, in which case the findings of the Commission are treated as the report of the Referee. It was not merely the province of the United States Circuit Court to enforce the judgments of the Commission, but to act upon them as an original proceeding. This is, of course, made more significant by the fact that the decision of the Commission was actually reversed. One of the subordinate points of the decision, if reported correctly in the newspapers, is of still greater importance. It is, that it is not incumbent on a railroad company to exchange with all other roads for through business on the same terms as those which exist between it and a company with which it has a contract for such exchange of business. If the idea underlying this statement is carried out it will conflict with some of the most essential parts of the Inter-state Commerce Act. It is too early to pronounce upon the results of this statement, or indeed on the decision as a whole, until the Supreme Court has passed upon the matter. That it will be appealed to the Supreme Court seems open to no doubt whatever.

The decision of the Post-Master General on a question of importance to many railroads, which is given in another column, is a simple act of justice. Whether the pay received by the railroads was high or low the methods taken to reduce it were illogical in the extreme. A hundred passengers who had paid \$30 apiece for a quick journey from New York to Chicago would probably feel rather indignant to be sidetracked for a train of dingy cars carrying letters paying less than a thousandth of that sum for their tickets; and their views of the comparative importance of the respective interests involved would doubtless conflict with the Post-Master General's opinion very decidedly. But there can be little question that in the long run his statement of the case rests on a true basis, though somewhat exaggerated. Whether or not all of the rules prescribed will work smoothly in practice remains to be seen. Negligence is of all degrees, and many fine points will have to be decided. If Smith's brasses or Jones' grease were universally used, hot-boxes might be abolished, so that if Smith or Jones imposed the fines they might be severe.

In the present state of mechanical practice it is irritating to hear a locomotive in operation with the exhaust so badly "out of square" as to make irregular blasts. Such engines are ridiculed as being "game-legged" and "one-sided," and yet in spite of the uncouth sound, and of the sarcasms bestowed upon master mechanics who allow their equipment to get into such a condition, there are several hundred engines running on one road out of Chicago, not one of which can be said to perfectly square. It is not unusual to hear a locomotive blast on the road which is so badly "out" as to lead one to suspect a slipped eccentric. The locomotives which haul vestibule trains are in as bad condition in this respect as any others, and the suburban engines are simply obnoxious to the musical mechanical ear. It is a small matter to adjust a valve motion, and there

can be only one cause which results in locomotives remaining badly "out of square," and that is, inexcusable negligence.

There is a demand for a well-balanced, light, high-speed stationary engine which can be placed in the forward end of the front baggage car of through passenger trains, and particularly in trains in suburban use, which are seldom disconnected from the engine, for the purpose of electric lighting. Such engines must be particularly well-balanced, and must run without vibration. The reason of this is that while an engine may be well enough balanced to run upon a solid foundation or upon any flooring which will not allow these small vibrations to become accumulative, such engines, when put upon a railroad train, are in the same condition in regard to the accumulation of vibrations as a tuning fork when placed before a Helmholtz resonator. The oscillating parts are heavy enough to start vibrations in front of the car where these engines are invariably to be placed. This front end of the car soon picks up these small vibrations, and oscillates on its springs in unison with the engine or dynamo. It is not necessary that the car vibrates the same number of times in a second as the engine; as long as the engine vibrations are a multiple of the vibrations of the car the result will be the same. The vibration of the front car is transmitted to the second, and so on until when the engine or dynamo is badly out of balance the shaking can be perceived at the rear of the train. This is particularly the case with vestibule trains, owing to the rigidity of the connections between the cars. The ordinary single connecting rod engine will not do at all for this purpose, unless it is placed lengthwise with the train. If there ever was a good field for a well balanced rotary engine, this is it, and the inventors, who have been laboring so hard in the past to obtain a well balanced rotary engine, have here a field which they can control if they can fill it. The electric light for trains is sure to be popular for many reasons, and at pretty nearly equal cost it would probably be used rather than gas in many cases. So far, the system of lighting by storage batteries has been too costly to encourage its use. The objections to a direct lighting system, which avoids the use of storage batteries, and simplifies construction and operation of electric appliances for lighting trains, are being gradually removed, and railroad men are looking forward to the time when they will be enabled to use upon passenger coaches, the same system of electric lighting with which they are familiar in offices and dwellings. Even now it is thought likely that all trains out of Chicago to the far West will soon be lighted by the incandescent light.

An attempt was made recently upon one of the trunk lines running out of Chicago to run a small engine, which drives a dynamo for electric lighting, with air supplied by an extra Westinghouse air pump placed on the engine. The result of the trial was not a success, just as one might suppose it would not be, owing to the small supply of air which could thus be obtained, compared to that needed. The actual horsepower stored in the air delivered from the air pump is not very great, and is wholly inadequate to drive dynamos and such machinery throughout the train. Better success could be obtained by taking the power from the steam heating pipes, but even this is bad practice. The greatest economy and a maximum power with a minimum weight of apparatus will be obtained only by using steam directly from the boiler of the locomotive. There are many objections to the use of air for such purposes, even if sufficient power could be obtained therefrom. There has been a tendency of late to use air about the train for various purposes, and in some cases this air has been taken from the train brake pipes. This interfering with the train brakes is not advisable, and the Westinghouse Brake Co., which surely has the efficiency of the brakes at heart more than any one else can possibly have, strongly objects to any interference with the air supply for braking purposes. It would be very convenient to draw on the train pipe for air in many cases, and would not only enhance the usefulness of the air apparatus now used for brakes, but would render it a more difficult matter to supplant the air brakes with other forms of brakes if the air could be used indiscriminately for all purposes. In spite of the desirable features of the extended use of the air supplied for train brakes to other apparatus, it is not advisable, on general principles, to interfere in any way with the operation of devices upon which depend the safety of life and limb, and up to the present time nothing has been demanded in train service which cannot be operated by some other driving power than the air which



is intended for braking the train. Recently attempts have been made to force the water, used for drinking and lavatory purposes, up into the basins by means of compressed air taken from the train pipe, and although this has been a success so far as neatness of design, and convenience of operation are concerned, yet the drinking water has had a strong flavor of oil. This flavor has its origin in the oil fed into the cylinders of the air pumps, the gases from which are mixed with the air and dissolved by the water, thus reaching the drinking fountain. This use of the air intended for train brakes has been objected to not only by the Westinghouse company, but by the Pennsylvania people as well. As first arranged a check valve was introduced between the train pipe and the pressure reservoir for the water service. Later a cock was put in, and now we understand that the Pennsylvania insists that there shall be no connection whatever between the air-brake system and the water service, but that air for the latter purpose must be compressed by a special pump worked by hand in the car. The draft upon the brake air supply, although not directly producing any serious interference with the action of the brakes, does render possible delays in operation, particularly the delays resulting from leakages which might otherwise be avoided.

In spite of the multiplication of third, fourth and fifth vice-presidencies, and the creation of various novel-named offices for the apparent purpose of following the fashion of changing (which General Alexander says in his *Scribner* article is potent in railroad affairs as elsewhere) railroad officers still are overworked, and have far too little time to keep themselves abreast of the improvements in the line of their profession. An officer of one of the best organized roads, in conversation, recently, alluded more than once to the multiplicity of burdens borne by a number of his associates, and his statements showed clearly that these men had no time for reflection, for looking ahead, or for careful study of events in other parts of the world. Their routine duties absorbed all their energies. If this is the case on a perfectly organized system, what must be the situation on the average struggling road? Just what it is seen to be in numbers of cases; the President, or at most the President and General Manager, are the only officers who take any careful notice of events in the railroad world outside of the immediate neighborhood. Civil engineers learn from each other through their societies, but the master car-builders and master mechanics who are progressive and enterprising are still found on a comparatively small part of the roads of the country. Superintendents who take any persevering measures to broaden their knowledge may almost be said to be scarce. Isolation gives a narrow outlook and its disadvantages, and isolation is fostered almost as much by constant overwork as by bigotry or original ignorance. We repeat that in a large number of railroad headquarters the search for knowledge is prosecuted for but a short distance beyond the ends of the officers' noses.

These considerations are brought to mind by a little incident recently reported. The introduction of interlocking switches and signals at a complicated passenger yard in a large Western city has been postponed, or at least retarded for some time, because some of the superintendents (a number of roads are interested) were in doubt whether the system would be feasible and adequate for the locality. The fact that scores of the most sagacious managers have deemed it profitable and economical to spend hundreds of thousands of dollars for improvements of this kind seems to be entirely overlooked. The daily conduct of a large train movement in yards of such limited area that traffic would unquestionably be blocked completely if only old appliances were available, and this in a number of cities, is a fact apparently unknown. It is not to be supposed that the roads involved are wholly destitute of officers who appreciate these well known facts, but the men who ought to be fully posted about them have not been brought in contact with the proper source of enthusiasm. The division superintendent does not fully appreciate the value of improved appliances, and so does not urge their introduction; the general manager who probably does have some appreciation of them is engrossed with other affairs, and so lets this matter wait.

#### The Future of the Cast-iron Chilled Wheel.

Whether or not the cast-iron chilled car wheel has yet reached something like its highest development is a disputed question. Its opponents claim its present to be nearly its final stage, beyond which it cannot be expected to much further develop. Its advocates hope

and claim that from it we may expect far more than we at present obtain. Those who lack confidence in this class of car wheel offer nothing in lieu of it, which can, for a moment, be considered as acceptable when the cost for the total American freight equipment for such substitutes as are offered is appreciated.

The chief objections to the cast-iron car wheel in use to-day may be classed as follows:

It is in one piece and a break in any portion of the wheel is dangerous, because of the possibility of its extension through the entire wheel. A composite wheel, on the contrary, might be fractured in one of its elements without necessarily increasing the liability of breakage of other parts.

Its lack of homogeneity renders difficult a satisfactory inspection before it is put in service. That is, it is quite impossible to tell, from an external inspection, whether or not a wheel has a uniform chill, or a solid body, or is free from excessive internal strains.

Its variation from a true cylindrical or conical form is destructive to the permanent way, and materially increases the resistance of cars under which such irregular wheels are placed. Absolute roundness is not often obtained in cast-iron wheels, and any attempt to discriminate against wheels which are not absolutely round would result in discarding a large number of wheels, and would further result in raising the price. It is true that wheels can be ground to a true cylindrical form, but this is somewhat expensive, and reduces the uniformity of thickness of chill. It should be noted here, however, that in Mr. Barr's recent exhaustive paper on this subject he says that the wheels made in the contracting chill are "almost perfectly round;" and Mr. Whitney claimed still further that he had found the wheels made in his chill nearer to being accurately round than steel-tired wheels that had just come off the lathe.

The fragility of the material composing the wheel renders it liable to breakage when submitted to sudden blows and shocks; the ideal car wheel has a tough and elastic plate which will bend rather than break. The cast-iron wheel is liable to breakage from expansion strains if brakes are used for long application and with much force on long gradients. The expansion of the rim of the wheel by heat, resulting from the friction of the brake shoes, tends to make the tread separate from the plate. This is liable to produce fractures in the plate.

On the other hand the cast-iron wheel has many good qualities; the following are among them:

Its minimum cost. It is doubtful if any composite wheel can be constructed, with our present knowledge of materials, which will, setting all other considerations aside, return as much service in proportion to the cost, as the cast-iron wheel.

A very hard tread, which is difficult to obtain in any other form of wheel. The hardness of the tread has a great influence on the wear, and further, a hardness in the tread resists cutting of the brake shoe.

Hard flange surfaces, which increase the life of the wheel materially, by resisting flange wear, and, further, materially decrease sharp flanges.

Lightness. Cast-iron chilled wheels weigh about five-eighths of an average of the composite wheels now offered for use. This low weight keeps down the ratio of the dead to the paying load of trains and decreases the amount of stored energy in the wheels when the train is in motion. This decrease of stored energy decreases the necessary braking pressure on wheels.

Many of the difficulties now met with in cast-iron wheels are not without remedy. Some of them are caused by improper boring of the axle fit, which results in the wheels being out of centre on the axles, and out of square with the axles. Often too great a strain is caused upon the plate of the wheel by reason of the excessive pressures used while putting the wheels on the axles. Slight variations in the location of the axle fit, either in regard to its concentricity or its angle with the plane of the plate, result in disaster to the wheels. Wheels, if not square with the axle, will receive constant blows on the flanges, as they rotate; such blows result in broken flanges. Failures arising from the improper fit of wheels on the axles are too often attributed to defects in the wheel castings.

The future of the cast-iron chilled wheel depends upon the possibilities of its continued development in the direction of (a) increased reliability; (b) increased carrying capacity; (c) keeping up the same mileage, as is now obtained, after the loads and speeds are increased, or getting perhaps an increased mileage under such conditions; (d) the possibility of obtaining greater uniformity in thickness of chill and in contour.

(a) Increased reliability can be got only by closer

inspection of wheels before putting them into service. It cannot be disputed that there are cast-iron wheels now running, and others which have been used and worn out in service, which are resisting and have resisted all of the normal and abnormal strains in the heaviest class of freight and passenger service. Some of these wheels have made a mileage of 115,000 miles in the same train and on the same car with inferior wheels which have made only from 20,000 to 30,000 miles, or even less. So far, this goes to show that the cast-iron wheel, in its best form, is a pretty reliable wheel when properly made. To obtain a knowledge of the character of a wheel before it is put into service, a much closer inspection than is ordinarily performed must be made. Such an examination cannot result from a cursory examination of its external appearance combined with a selection, at random, of one wheel among a hundred, and subjecting it to a drop test, but must come from an intimate knowledge of the methods used in casting and in annealing the wheel, and an acquaintance with the apparatus used in its production. Still further, investigation must be made of the character of the wheel iron before it is put in the blast furnace and of the process of melting. Without a knowledge of these details a proper inspection of a cast-iron chilled wheel cannot be made.

(b) Whether an increased carrying capacity can be obtained from the cast-iron chilled wheel or not is hardly a question of dispute. There is no reason why a wheel weighing 1,000 lbs. should not be as reliable as a wheel weighing 500 lbs., and have a proportionately greater carrying capacity, if it is *equally well designed*. There is, however, some discussion going on in regard to the possibility of disintegration of the surfaces of the tread of chilled wheels under heavier loads; but disintegration is not shown by practical use to be a prominent cause of failure of chilled wheels under cars carrying as much as 60,000 lbs. Some of the wheels which have made over 100,000 miles have been used under some of the heaviest loaded cars in freight service. Further, if disintegration does take place, it is doubtful whether a tread of any other material would be more durable than chilled cast iron. There is then no apparent reason why cast-iron wheels cannot be made with an increased carrying capacity.

(c) The question of getting the same mileage as at present under heavier loads is closely allied to what has just been stated. If there be an increased disintegration of the tread when heavier loads are applied to chilled wheels, such will probably be the case with all wheels, regardless of the material of the tread; and all that can be required of a cast-iron wheel is that its mileage shall decrease at no greater ratio, for increase of load carried, than does that of the composite wheel.

(d) Greater uniformity and depth of chill, as well as greater care in selection of material, will probably increase the life of the tread of cast-iron chilled wheels, and we may expect this increase to balance, if not overbalance, the decrease in mileage resulting from an increased wear brought about by heavier loads per wheel.

The possibility of obtaining greater uniformity in thickness of chill and in contour by the use of the contracting chill has long been claimed by the Whitneys, and many of our readers will remember the striking illustrations published in the *Railroad Gazette*, May 20, 1887, showing side by side fragments of wheels cast in the contracting and in the ordinary chill. These possibilities are most forcibly presented in Mr. Barr's paper, which appeared in our issue of week before last, giving some of the results of practice on the Chicago, Milwaukee & St. Paul. The record given in that paper of uniformity of chill, and perfection of contour and of increased mileage, shows such a marked improvement over the average car wheel in the market, and there is further shown to be such a small percentage of loss in the foundry where these wheels are made, that we are bound to believe that the development of the cast-iron wheel is not yet complete. Moreover, there is no reason to suppose that there are not possibilities of making cast-iron wheels with even greater uniformity, greater perfection of contour and increased reliability with a still further decrease in foundry losses. This statement is in no way a reflection upon the best wheelmakers of the day, because the best wheels cast by the best makers may be quite as satisfactory as the wheels cast by Mr. Barr's process. There is, however, in the ordinary method of casting wheels, a greater liability of loss and a greater uncertainty as to the character of the wheel after it is cast. Having made this step towards a perfection in cast-iron wheels, there is no reason to



believe there are not other steps which can be taken in the same direction.

There is still another path which may lead to improvement in cast-iron wheels; it lies in the almost unexplored domain of cast-iron alloys. Superior castings are now made from iron combined with silicon, aluminum and various other metals which increase strength and improve the uniformity of product. Whether such alloys will be capable of producing a chilled surface equal in quality to the chill obtained from pure cast iron is as yet undetermined. If they do not in any way interfere with the chilling of the wheel we may hope for further improvement of the cast wheels in this direction.

The cast-iron chilled wheel of the future will be more uniformly treated in service than those of the present. This will result principally from the extended use of air brakes. Now many wheels are ruined by lack of uniformity in the braking power, which depends upon the physique and judgment of the class of men handling freight trains whose "make-up" tends to deteriorate rather than to become more intelligent. This lack of uniformity in brake pressure is particularly noticeable upon roads having heavy steep grades where the irregular application of the brakes results in some of the wheels being over-braked, causing over-heating and "skidding" in a marked degree. Until the braking power is removed wholly from the hands of the brakemen there will be much trouble with over-heated and skidded wheels. If there were no other reasons to believe that the cast-iron chilled wheel has a future before it we might still expect from it an increase of efficiency as soon as power brakes, operated by an intelligent engineer, are generally adopted. A suggestion of what may be expected in this way is also found in Mr. Barr's paper. Since the use on his road of a special report of slid wheels combined with close attention to the adjustment of brakes, the percentage of wheels removed for sliding has greatly diminished. The proportion which such wheels bore to all removed was, in 1884, 46 per cent., and in 1888, 12 per cent. The reduction was continuous through the intervening years.

On the whole, we may conclude that there are still great possibilities of development in the cast-iron wheel, and that investigation and experiment will be followed by further improvement.

#### Proposals for Railroad Combination.

The effort at railroad organization is being continued on a larger scale than before. Meetings of railroad presidents and leading financial houses have been held in this city. They dealt primarily with the affairs of Western roads; but representatives of the trunk lines, and of the Inter-state Commerce Commission itself, have been consulted as to the measures to be adopted.

It does not appear that anything definite has as yet been done; nor does it appear precisely what is to be done. We are told that harmony prevailed in the meetings; but as long as no measures have been adopted for enforcing harmony outside of the meetings little will be accomplished. As an official of the Chicago & Alton is reported to have said, in explaining its reasons for not sending representatives to the meetings, there are already western freight and passenger agreements just as strong as the one adopted by the presidents. Additional pledges, as distinct from additional means of enforcement, seem likely to be of very little use, even though they be executed with the greatest solemnity.

Three means are suggested for enforcing the maintenance of rates:

1. The establishment of a clearing house.
2. The evasion of the pooling clause of the Inter-state Commerce Act.
3. The consolidation of the competitive business under the management of a single company.

Apart from the question of rates, the existence of such a clearing-house is of great value to almost all parties concerned. To the railroads it saves the necessity of partial payments on shipments of through freight, and enables the different companies to settle with one another by book credits and balances instead of by actual cash payments. In short, it does for the whole system of freight accounts what a fast freight line does for the settlement of car mileage balances. We are so used to the existing system that many of us fail to appreciate the unnecessary work involved in the collection of back charges; but it is an antiquated and cumbrous method of doing business, and it is astonishing that it should have been allowed to continue so long.

To railroads and shippers alike a clearing house

furnishes a welcome means of locating loss or damage, and even of tracing lost articles. In these respects the existing freight lines are far from satisfactory. It sometimes seems as if nobody was responsible for anything. In these respects the old-fashioned freight line, like the Merchants' Despatch, was better than the modern co-operative one.

It is possible for a well-organized clearing house to meet most of these difficulties. If it is incorporated, as is proposed in the present case, it is a responsible party with which the shippers can deal. If thoroughly organized, it can follow up cases of loss or damage far better than any individual railroad. It is not obliged to depend upon the reports of other companies for its information as to the facts in the case. It has employees of its own whose business it is to look after these matters, and who become wonderfully skilled in their business. The history of the English clearing house furnishes the best proof of what can be done in this way.

But all this does not prove that the clearing house can maintain rates. As far as the facts go, they prove the contrary. The managers of the English clearing house have habitually taken the utmost care not to interfere in rate agreements. It not only makes no rates, it does not even take the initiative in dividing them. It simply acts as an agent to carry out the wishes of the companies; and its business is grouped in such a fashion that if any dispute arises with regard to divisions, the doubtful part can be left unsettled for the time, without interfering very much with the regular course of settlement on other transactions. It is undoubtedly true that the passage of business through the clearing-house gives a certain publicity to the action of freight agents, and thus far makes evasions of the published tariff more difficult. But it does not make them impossible, nor does it prevent mutual suspicion on the part of rival lines. As a means of good railroad economy a clearing-house is most valuable as an auxiliary to a pool. It helps to maintain rates smoothly, but as an independent force in maintaining rates without a pool its value is not so great as some people think.

Another set of proposals looks toward the re-establishment of pooling under a form so modified as not to be obnoxious to the law. There are several ways suggested. The most straightforward is to attempt to secure such a modification of the law as shall sanction pooling contracts, provided they are approved by the Inter-state Commerce Commission. This would do extremely well; but we fear that there is little chance of securing any such result. Another possible scheme is to let competitive business pass through the clearing-house, and arrange to make an insufficient allowance for expenses on traffic in excess of an agreed percentage. This, without actually diverting traffic, makes any such excess unprofitable to the road which obtains it. It removes much of the suspicion that rate cutting is done on purpose; and it usually induces the road which is running ahead of its percentage to reduce its volume of traffic by stiffening its rates. Unfortunately it involves so palpable an evasion of the law against pooling that there is reason to fear that it will not be allowed. A committee of railroad men is about to confer with some of the Commissioners to see what can be done in these directions. The result of this conference will be looked for with the utmost interest.

There remains still another plan which has been suggested—a sort of consolidation of competing interests, not unlike a trust. Some propose a system of leases, others an incorporated company to take charge of the competitive traffic. We cannot see how either of these plans can have any immediate chance of success. The practical difficulties in the way of their execution are very great, and even if these could be overcome it is doubtful whether any system could be devised which should make our railroad presidents efface themselves and work as subordinates under a common authority. When Charles Francis Adams and Jay Gould work in complete harmony under any trust or other agreement it will be a surprising sight.

At the same time, the drift of events is somewhat in this direction, and the Inter-state Commerce Law seems to hasten rather than retard it. If pools are forbidden, and any less close combination is insufficient, the tendency will be to seek something closer. The Richmond & West Point system is more like a trust than any other railroad combination which we have; and the results thus far obtained seem to tell in favor of the methods pursued in that case. As between an agreement which does nothing, and a consolidation which does everything, there will be a strong tendency to choose the latter alternative.

#### The Block System.

Although up to this writing the present winter has given the railroads of the country very little trouble from snow, it is reasonably certain that this fortunate immunity must soon end. We are not speaking now of tremendous blizzards and delayed and suffering passengers, but of the ordinary vicissitudes of winter: the irregularities of freight trains and the minor derailments; the breakages of iron and steel, which in spite of speculations do occur most frequently in winter; the annoyances and risks incident to running plows and flangers, and so on. All these incidents increase the liability to collision, and frequently cause a marked rise in the collision record. Even the mildest winters add more or less to the expense accounts and to the cares of superintendents; and blinding storms which trouble and endanger the trainmen are numerous even where big drifts are not much heard of. It will be recalled that the Massachusetts Railroad Commissioners, in a report published last winter, advised managers to specially refresh the memories of their train and station men at the opening of winter concerning the peculiar dangers incident to the cold season.

While these dangers are numerous, this very fact may weaken any admonition given by a superintendent, railroad commissioner or any one else. To recall to the men's minds all of the multitudinous evils that may beset them is as ineffectual as to tell them that if they are virtuous they will be happy. One of the worst train accidents of last winter happened just after the general manager had issued a large sheet-full of cautions to the employees. We desire, therefore, to recall just here a single point among the many that might be named. We refer to the advantages of the block system. While this is an improvement the adoption of which can be considered independently, it being unaffected by others except financially, the benefits from its use are by no means confined to narrow limits, and a considerable portion of the varied evils resulting from the mishaps mentioned above may be cured by it.

The value of the principle of the block system is perhaps well enough recognized. A great majority of managers, perhaps all, approve of it for very heavy traffic, but as the expense attending the operation of the non-automatic system, as seen on large roads, is very heavy, hardly any one cares to face the question whether his own traffic really needs the additional protection. Many will readily agree with the manager quoted in the *Railroad Gazette* three months ago, that the traffic of roads averaging a train an hour demands the block system; but where there are, say, only 12 trains each way daily, they are not so positive. And yet a good many collisions occur on the latter class of roads; and, in view of the longer block sections possible, and the fewer special operators required, it is quite likely that the additional expenditure would be as surely returned in immunity from accident and enhanced reputation on one road as on the other.

The specific advantages of the block system should be too well known to need rehearsal. The superintendent whose rear collisions are too few to give him an interest in all possible means of preventing them would not, probably, be convinced by anything we could say here. The question whether advantages, admitted to be desirable, are possible financially for your road cannot be decided by generalizations. But the special hardships of trainmen in cold weather, and the greatly added danger to trains incident to the prevalence of snow-storms does justify a word. A body of heavy snow furnishes such a convenient cushion that many accidents are less fatal to trainmen than they would be if occurring in summer, but the aggregate of injuries each winter is worthy of attention, nevertheless.

In a snow-storm the runner often can see no further ahead than in a dense fog, and the alertness required in the flagman to effectually display a red flag may be even greater than in case of fog. Placing torpedoes is more difficult than at other times, and the danger of their being brushed off the rail by track brooms, or otherwise, is always feared. Snowplows, if run at good speed, often cover themselves with snow so as to constantly impair the view of the man in charge. If run too slowly they do not effectually clear the track. A brakeman staying out half an hour in the coldest weather not only risks his health and possibly his life (which is important to him), but also his efficiency as a signal man, which is important to the corporation—even if it be a soulless one. Humanitarian considerations alone can, therefore, be reasonably adduced as furnishing sufficient ground for making every possible effort to introduce the block system. Add to this the improvement in general



discipline of enginemen resulting from the discontinuance of a system which constantly sets them the example of risky running—of not always taking the safe side in cases of doubt—and we certainly have a strong motive, aside from immediate financial gain.

The evidence that blocking is feasible on small roads and on single track lines, without expensive special apparatus and without a great number of operators to give their exclusive attention to it, is good and strong. The Canadian Pacific uses the system on 1,600 miles, and is increasingly satisfied with it. Its use on the Chicago, Milwaukee & St. Paul was told of in these columns June 22 last. Another Western road uses it, and deems it indispensable, on a twenty mile section of unusually busy single track. Still another, whose territory is particularly liable to fogs, blocks trains by orders from the dispatcher's office much of the time, and attributes its good record of immunity from rear collisions to this fact. With testimony so positive, even if the number of roads cited is not great, the question deserves attention from every superintendent. The prevention of rear collisions is one of the most difficult problems in American railroading, and the absolute block system is known to be the most rational remedy for the difficulty. The prevention of butting collisions is an equally serious matter. While the remedy in this case is not so certain, there is no doubt that blocking reinforces ordinary dispatchers' safeguards and thus reduces, if it does not remove, the danger of butting collisions. The staff system is acknowledged by good authorities to be well calculated to provide against butting collisions, whatever its defects may be. Single track blocking by telegraph secures some of the advantages and eliminates some of the disadvantages of the staff system. If only proper caution is used, and constantly maintained, in the practice of permissive blocking, which seems to be a necessary evil on most roads that block, there is little question that many roads could and should make use of the block system to a considerable extent.

#### Annual Report.

*Richmond & West Point Terminal.*—This company now controls nearly 7,000 miles of railroad line, as follows:

	Miles.
Richmond & Danville Railroad and leased lines.....	838
Richmond & Mecklenburg Railroad.....	31
Clarksville & Durham Railroad.....	57
Virginia Midland Railway.....	413
Washington, Ohio & Western Railroad.....	50
Charlotte, Columbia & Augusta R. R.....	373
Columbia & Greenville Railroad.....	296
Western North Carolina Railroad.....	250
Statesville & Western Railroad.....	20
Asheville & Spartanburg Railroad.....	70
Northeastern Railroad of Georgia.....	60
Knoxville & Augusta Railroad.....	16
Oxford & Henderson Railroad.....	13
The Georgia Pacific Railway.....	516
East Tennessee, Virginia & Georgia System.....	1,603
Central Railroad of Georgia System.....	2,203
Total.....	6,889

To which may be added 500 miles of water line—200 of the Baltimore, Chesapeake & Richmond boats, and 300 of the Ocean Steamship Co.

The general balance sheet Nov. 30, 1888, is as follows:

Dr.	
Stock, bonds and property.....	\$55,682,488
Bill receivable.....	71,500
Unpaid stock subscriptions.....	6,000
Advances to companies.....	562,013
Cash.....	25,347
Profit and loss.....	315,510
	\$56,642,860
Cr.	
Capital stock (common).....	\$40,000,000
" (preferred).....	5,000,000
Six per cent. trust bonds.....	9,902,000
Bills payable (including temporary loans—\$4,200,000, to pay for Georgia Company stock, for which permanent financial arrangements are now being made).....	4,740,860
	\$56,642,860

The most important item in the stocks owned is \$12,000,000 of the Georgia Company. The next largest is \$6,500,000, East Tennessee, Virginia & Georgia 1st preferred. The Richmond & Danville property, which formed the nucleus of the whole, has been quite overshadowed in all this subsequent growth.

The President's report simply says: "The leading motive actuating your board of directors in the acquisition of this extensive system has been the belief that unity of management must result in great economies, in the production of better facilities and higher efficiency demanded for the public in the way of safer and quicker transportation of freights and passengers, and comprehensive equipment requisite to meet the increasing traffic in both local and through business, which cannot be effectively met by detached local lines." The general results seem fairly to warrant this statement. They are as follows:

	1888.	1887.
Gross Earnings.		
Richmond & Danville System.....	\$8,847,192	\$8,196,208
Georgia Pacific Railway.....	1,324,926	1,159,654
East Tennessee, Virginia & Georgia system.....	7,367,006	6,383,409
	\$17,539,214	\$15,739,421
Expenses.		
Richmond & Danville System.....	\$5,382,872	\$5,045,717
Georgia Pacific Railway.....	957,780	729,809
East Tennessee, Virginia & Georgia System.....	4,780,670	4,307,490
	\$11,121,322	\$10,083,016

	1888.	1887.
Net Earnings.		
Richmond & Danville System.....	\$3,464,320	\$3,150,581
Georgia Pacific Railway.....	367,146	429,845
East Tennessee, Virginia & Georgia System.....	2,586,426	2,074,979
	\$6,417,892	\$5,655,405

Showing the following increases:

	Percent.
Gross earnings.....	11.44
Expenses.....	10.29
Net earnings.....	13.48

The reports of separate companies composing the system are not given in detail. Some of them have been previously made public. Others, like that of the Richmond & Danville, which has just come to hand, are incomplete. There seems to have been some oversight in making up this report. The figures of earnings of the main line are not given in detail. Nowhere are we told the amount of revenue from freight and passengers. On the other hand, the classification of expenditures is very complete, and shows that the increase in net earnings is a real and not a forced one, maintenance expenses having increased in substantially the same proportion as other items.

The report of the Richmond & West Point Terminal is conspicuous as showing not merely an increase in gross earnings of the systems, but a still greater increase in net earnings. Thus far the effects of consolidated control seem to be thoroughly good. The dangers involved in the form of combination of which the Richmond & West Point is the most prominent type are to be looked for in other directions. This company is, in substance, a financial concern which controls railroads by ownership of a majority of their securities. The Pennsylvania and other roads have done the same thing in times past, but the difference is that the Pennsylvania is a railroad while the Richmond & West Point is not. This gives the operations of the last named company a more distinctively financial character. It also creates a danger that minority rights may be sacrificed for financial purposes. Not that the Richmond & West Point has done so; its conduct in this respect has been so straightforward as to be an important element in its success. The continuance of Gen. Alexander in the presidency of the Georgia Central gives added reason to believe that this policy will continue. But there is none the less a possibility of great evil in this direction, and we trust that the courts will see the danger, and the necessity of throwing additional safeguards over the rights of minority stockholders. Apart from such protection, a minority stockholder in a case like this is even more helpless than he is anywhere else.

The pass question has lain dormant, as it were, since the agitation started by the consistent and inconsistent action of numerous companies following the passage of the Interstate Commerce law with its real and imaginary prohibitions. One of the absurdities of the system has recently cropped out in a mild newspaper excitement at St. Paul over a little difference between the St. Paul, Minneapolis & Manitoba and the Northern Pacific. The President of the last-named road returned the annual exchange passes sent him by the other, because they were stamped with a limitation, excluding the holder from certain trains between St. Paul and Minneapolis. It is said that there were still 32 trains each way daily on which the passes were available, and that this was deemed enough. The only interest that this incident can have to railroad officers in general is to again illustrate the inequalities of the present custom and the ungraceful conditioning that has to be resorted to, to keep it from running to extremes. To give a president or a brakeman a complimentary ticket, is a pleasing amenity, but to tell him that you fear he will ride a free horse to death is not so pleasant. Granting favors with good taste is difficult enough at best; doing it by machinery or by rubber stamp, is probably impossible.

A typical instance of the way demoralization of rates comes about, appears in the report of a diminutive rate war west of the Missouri during the past week. The Rock Island suddenly reduced its passenger tariff from Kansas City to Colorado points from \$18.25 to \$15. Inquiry showed that it was claimed that the Missouri Pacific had sold a ticket to Pueblo for \$15. As the roads had made a particularly solemn agreement to maintain rates from Jan. 1, this news caused considerable excitement in Wall street. The Rock Island claimed to possess an affidavit that a \$15 ticket had been purchased over the Missouri Pacific's counter, but it appears that it was bought of a broker. It was marked "Issued on account of employé," and had probably been issued at half-price to some employé, who traded it off. Explanations followed all around, but not until reductions had been made by two or more roads, which necessitated ten days' notice for restoration. An instance of the difficulty of tracing irregularities in freight rates is shown in the statement published this week that a road west of Chicago, discovering too low a rate on a large shipment of track material, found that the quotation was made by the Wilmington & Northern road. At last accounts the officers of the Western Freight Association were trying to establish communication between Chicago and Wilmington, Del. The attempt seems to be attended with as much difficulty as getting an answer to a tracer for a 100 lb. shipment which some uninfluential shipper complains has not reached destination.

The Northwest Railroad Club makes a promising beginning. At its first meeting for technical discussion last Saturday, it started a comparatively fresh subject, and enlivened the talk with some remarkable experiences, drawn

straight from the home of the blizzard. The art of handling snow has reached its highest development in the Northwest, and what the Northwestern railroaders have to say on the subject will be read with interest. An abstract of the discussion appears on another page. Unless Mr. Leslie is disappointed by an unusually open winter, there will be an opportunity for Eastern officers to see what the rotary can do, as he has made arrangements with the Rome, Watertown & Ogdensburg for 25 miles of track to clear, and will be given a chance to collect his spectators.

The *Travelers' Official Guide*, whose editor, Mr. W. F. Allen, conceived the plan which made possible the introduction of standard time all over the United States in 1883, states that all the railroads in the United States and the Dominion of Canada, without exception, now use the standard time of one of the four sections—Eastern, Central, Mountain or Pacific. Cities and towns have very generally conformed to railroad time. Out of 228 cities of over 10,000 inhabitants, less than 25 still retain local time, and 15 of these are in Ohio. The principal exceptions outside of Ohio are Detroit, Mich.; Louisville, Ky.; Augusta, Me., and Savannah, Ga.

The Chicago & Northwestern shops commenced on Jan. 1 running on 8 hours time. This reduction of the working hours is the result of the small freight business now doing on this line. Unless the freight business increases there will be a still further reduction of the working force.

The cars built to run in freight service, by 37 firms, during the year 1888 were given in our last issue as 62,280. Additional returns from six car-works give 9,439, or a total by 43 works of 71,719. Further information from the railroad companies makes the total freight cars built by 69 companies 20,502.

#### TRADE CATALOGUES.

*Modern Heliographic Processes: A Manual of Instruction in the Art of Reproducing Drawings, Engravings, Manuscripts, Etc., by the Action of Light.* By Ernst Lietze, M. E. D. Van Nostrand & Co. New York, 1888. Price, \$3.

Heliograph, or sun printing, is the general name covering all of the various methods of reproducing drawings and similar objects by the action of sunlight on a chemically-prepared surface. The subject is really a branch of photography, and the best known and most perfect form of sun print is the toned, silver, albumen reproduction of the photographer's portraits and views. This method is, however, too tedious and expensive for the use of the engineer and draughtsman, and during the last few years a great deal of work has been done in developing similar processes for producing less ornamental, but perhaps more useful results. The best known of these is the common blue print, which was discovered by Herschel fifty years ago, but which has been used by engineers for less than fifteen. This process leaves nothing to be desired in the way of simplicity and cheapness, but it gives negative results, and is, therefore, only useful for line drawings. Further than this, it is scarcely possible to make additions and corrections to the print, and it is in turn difficult to copy or retrace.

Within the last few years a great deal of attention has been given to producing positive prints, and a number of methods have been brought within the reach of the profession, although none of them are as simple and easy as the blue print negative; still, all of the professional printers and many large engineering offices regularly turn out work in black lines and light ground, and the methods can fairly be called practical. The author of this book has had occasion to try a great many of these methods, and to learn the peculiar advantages and possibilities of each, and his book is in reality a compilation of nearly all of the methods now known for doing practical work.

He presents us first with a description of the mechanical apparatus used for work either on a large or small scale. He then gives the methods, grouped according to the sensitive chemicals, under four general heads: Silver prints, iron prints, chromium prints and uranium prints. Each process which has any claims to usefulness is described in great detail, and the thorough nature of the work can be judged by the fact that the author includes a large number of patented methods in order to complete the series. This completeness is, in fact, the fault of the book. The author would have made it of greater value to many busy engineers had he pointed out more clearly the few methods which his experience has taught him are the most certain to give good results to men who have limited quantities of work as well as little time to spend. As it is, the reader, unless he is interested in the subject, finds himself bewildered by the numerous promising methods before him. To the experienced printer, however, the work will no doubt be a great boon, as it gives in small compass information which could only be obtained by elaborate search through the periodicals, not only in English but in foreign languages.

One very interesting feature of the book is a collection of ten specimen prints, showing the results obtained by the different typical methods.

From the 80 or 90 processes described, we select the following as being new to most engineers, and of considerable interest.

*First.* A modification of the Willis process, the patent on which has expired. The paper is floated for one minute upon a bath made of bichromate of potassium, 1 part; diluted phosphoric acid solution, 16 parts; water, 16 parts, and is then dried quickly in a dark room. The paper is then exposed in a printing frame in the usual manner, the time being about



five times that required for ordinary blue prints. It is important that the time should be correct, as under-exposure gives a colored ground, and over-exposure a very poor print. The print is developed by being left to dry in a dark flat box which has been sprinkled with a mixture of raw oil of aniline, 30 drops; benzole, 1 ounce.

The print must not come in contact with this mixture, but must be perfectly accessible to its fumes. The image appears in a few minutes, and rapidly gains in intensity. The color is dirty green, but becomes blue or blue-black after the print has been thoroughly washed in water acidulated with 1 per cent. of sulphuric acid, then washed in pure water, and finally in water containing 1 per cent. of ammonia.

**Second.** A positive carbon print of the author's. The stock solution consists of bichromate potassium 1 part, water 10 parts. To this add ammonia water with stirring until the reddish color commences to turn yellow. Four oz. of this are mixed with  $\frac{1}{2}$  oz. powdered gum Arabic,  $\frac{1}{8}$  oz. granulated white sugar,  $\frac{1}{8}$  oz. lampblack which has been thoroughly worked up with a few drops of glycerine and alcohol, before being mixed with the other ingredients. This mixture will not keep long, and must be continually shaken while being used. The paper is coated with it by means of a brush, which should be used quickly. The paper should then be dried rapidly, using artificial means if necessary. When thoroughly dry the printing is done in the usual way, the exposure requiring eight to ten minutes of sunlight. The print is then taken out and soaked in water until the parts not acted upon by the light soften so much that the black can be removed by means of a camel's hair brush. As soon as the picture gets in perfect shape it is washed in clean water and hung up to dry. Under-exposure is fatal, but over-exposure can frequently be remedied by the use of warm water.

**Third.** The following indirect method of printing positive prints is probably known to many readers: The original tracing is prepared in white on a colored ground, thus resembling an ordinary blue print, and blue prints are taken from it, the results of course being blue lines on a white ground. The method is to make the original tracing on tracing paper, using black lithographic or autographic ink. When dry, the paper is stretched upon a board and carefully painted once or twice with a concentrated solution of aniline brown. After this dries, the lines are rubbed carefully with a sponge or piece of cotton saturated with oil of turpentine; this dissolves the ink and removes it, but has no effect upon these parts of the paper which are stained deeply by the aniline. After the ink is thoroughly removed, the lines will appear transparent in a dark reddish-brown field.

The first issue of *Electric Power* makes its appearance this month. It is a monthly, conducted by Ralph W. Pope and George H. Stockbridge, and published at 150 Broadway, New York. Both of these gentlemen are well known as writers on electrical matters and as men of practical attainments. The object of the new journal is thus concisely stated in the editors' announcement:

"It is the purpose of this journal to assist in bringing to public attention the manifold advantages of electric power. It will show that the electric motor is one of the most simple, safe, effective and economical machines that can be used for the distribution of power. Its proper mission must, however, be understood. For many purposes the steam-engine acts direct without the intervention of gearing or belting, as in the case of the locomotive and the steamship, which are driven by the application of power to the crank. For most industrial purposes, however, steam or water power must be distributed by shafts and belting, in which cases the distance over which it can be conveyed is limited, while the loss of energy through friction is great. This is one of the fields which the electric motor is destined to occupy."

Messrs. Rand, McNally & Co. announce the issue on Feb. 1 of the 1889 edition of their Indexed Business Atlas. This publication was enlarged in size last year, and the plan has been adopted of showing each railroad system separately by distinct colors or symbols. The merits of this atlas are too well known to call for comment.

#### NEW PUBLICATIONS.

**Car Truck and Track Equipment.** An illustrated catalogue of the material made by the Ramapo Wheel & Foundry Co., Ramapo, and the Ramapo Iron Works, Hillburn, N. Y.

This is a catalogue of 114 pages, showing a variety of wheels, brake shoes and other parts of running gear, and of switches, signals, frogs and crossings. The illustrations are admirable. Most of them are reproduced by "wax process" from detail drawings made to scale, and there are several fine "Indotype" reproductions from photographs of yards showing arrangements of slip switches. It is regrettable to see among these two views of complicated main track switches in important yards of a very rich railroad which are unprovided with interlocked signals. The elegance of the buildings and neatness of other surroundings indicate enterprise, but the presence in main tracks of from a dozen to 20 common switch stands, bunched as closely together as they will stand, tends to destroy the good impression. The detail drawings include, besides the standard appliances of the two companies, several interesting examples of complicated crossings, with slip switches and special crossing frogs. The Potter compensating semaphore signal, recently brought out, is shown in detail. There is almost no descriptive letter press in the catalogue, but the drawings are so complete that it is hardly missed. The book is from the De Vinne press, and is beautifully printed.

**Burlington Route Calendar.**—The well-known rectangular black-and-white trade-mark of the Chicago, Burlington & Quincy makes its new year's appearance in connection with a clear and convenient office calendar, and surrounded by an

elaborate steel engraving, made especially for the company by John A. Lowell & Co., of Boston. The subject of the engraving is the chariot race described by Gen. Lew Wallace in his story of "Ben-Hur," and the artist has treated it very effectively.

**Catalogue of Gate Valves and Fire Hydrants Manufactured by the Chapman Valve Mfg. Co., with an Engineering Appendix.** Boston, 1888. 12mo. Catalogue, pp. 67; Appendix, pp. 166.

The catalogue of these well-known valves and hydrants is handsomely illustrated, and contains full details of dimensions, etc. The engineering appendix, compiled from standard works, forms a useful pocket book for engineers, containing general engineering data, together with formulas and tables relating to hydrodynamics, steam and gas. The book is substantially bound, and represents a type of catalogue well worthy of being copied by other manufacturers.

#### Canadian Railroads.

The last annual report of the Dominion Minister of Finance, just issued, shows that during the fiscal year ending June 30 last, the sum of \$1,027,041 was paid out of the Dominion treasury on account of railroad subsidies as follows: Albert Southern, \$18,428; Baie des Chaleurs, \$50,300; Buctouch & Moncton, \$20,573; Caraque, \$40,050; Drummond County, \$15,057; Dominion Lime Co., \$11,840; International, \$8,960; Joggins, \$26,138; Leamington & St. Clair, \$32,000; Long Sault & Temiscamague, \$3,000; Montreal & Lake Champlain Junction, \$16,400; New Brunswick & Prince Edward Island, \$16,000; Northern & Western, \$159,400; Pontiac & Pacific, \$24,158; Quebec & Lake St. John, \$232,013; St. Lawrence & Lower Laurentine, \$28,383; Temiscouta, \$249,684; Toronto, Grey & Bruce, \$14,656; West Ontario & Pacific, \$60,000.

In addition to these subsidies to public corporations, chargeable to capital account, there were expended the following sums on account of government railways: Cape Breton Railway, \$689,450; Intercolonial, \$742,203; Oxford & New Glasgow, \$280,932. Up to the date of the Minister's report there had been expended \$32,492,127 on account of the Intercolonial; \$61,812,884 on the Canadian Pacific, and \$1,286,551 on the Eastern Extension, Nova Scotia.

The total expenditure on government railways and canals last year, chargeable to income, was \$4,160,332, against \$3,673,894 in 1887. The total earnings of the Intercolonial was \$2,912,783, and working expenses, \$3,276,441, leaving a deficit of \$363,643, compared with a deficit of \$232,105 in 1887. The Prince Edward Island Railway (government) earned \$158,363, while operating expenses reached \$229,639, leaving a deficit of \$71,276, against a deficit of \$48,394 in 1887.

#### TECHNICAL.

##### The Cyclone Snow Plow.

The Vulcan Iron Works, of Chicago, have received an order to build for Minneapolis parties a rotary steam snow plow of the "Cyclone" type, fitted with Caldwell's patent auger. This machine, when completed, will be the largest of its kind yet built, having three double engines, with cylinders 18 in. long, 16 in. stroke, and a locomotive type boiler with 1,500 sq. ft. of heating surface. The car will be made of structural iron, and the trucks will be of especially heavy design. The entire car is calculated to weigh 55 tons.

##### The Nicaragua Canal.

The directors of the construction company have decided to reinforce the engineers and workmen now on the scene of operations at the earliest practicable day. The new force will go prepared to begin excavation along the line of the proposed canal. Within the past year about \$500,000 has been spent in the completion of surveys. The construction company now report cash on hand, paid in subscriptions, of \$2,000,000, with which digging and other actual construction work will be begun. It is believed that the issue of \$200,000,000 of bonds will provide means for the continuance of operations without interruption.

##### To Build Steel Cars.

A company is being organized at Louisville, Ky., for the construction of shops there for building the steel cars described in last week's *Railroad Gazette*. The matter is being pushed by Maj. T. H. Hays, of Paducah, Ky., formerly Superintendent of the Pullman Palace Car Co., at Louisville.

##### Wind on the Brooklyn Bridge.

The high wind of Saturday night, Jan. 5, blew the cable of the Brooklyn Bridge out of the sheaves, at least it is said that it rocked the cars like a cradle, and the grips displaced the north cable. When the machinery was stopped a few minutes later the cable was found lying on the ties from a point at the Brooklyn tower to near the New York entrance. At 4 A.M., when the gale was at its height, Edward Harkins, bridge rigger, ventured down on the ties and began the laborious task of replacing the cable.

##### The Brooks Locomotive Works.

In the last week of 1888 the Brooks Locomotive Works turned out one 52-ton mogul engine for each working day. This was done with the regular working force of 1,000 men, and surpasses any previous record, except when the works were running nights, during the locomotive boom in 1882. The locomotives now built are much heavier than at that time, so that the present output from the Brooks works really means a greater production than ever before.

#### General Railroad News.

##### MEETINGS AND ANNOUNCEMENTS.

###### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:  
*Canadian Pacific*, 3 per cent., payable Feb. 18.  
*Huntingdon & Broad Top Mountain*,  $1\frac{1}{2}$  per cent. on the preferred stock, payable Jan. 28.  
*Little Schuylkill Nav., R. R. & Coal Co.*,  $3\frac{1}{2}$  per cent., payable Jan. 12.  
*Mill Creek & Mine Hill*, 5 per cent., payable Jan. 11.  
*Milwaukee, Lake Shore & Western*,  $2\frac{1}{2}$  per cent. on the preferred stock, payable Feb. 15.  
*Mine Hill & Schuylkill Haven*, \$1.75 per share, payable Jan. 15.

*Mount Carbon & Port Carbon*, 6 per cent., payable Jan. 11.

*Schuylkill Valley Navigation Co. & Railroad Company*,  $2\frac{1}{2}$  per cent., payable Jan. 11.

*Terre Haute & Indianapolis*, semi-annual, 3 per cent., payable Feb. 1.

###### Meetings.

Meetings of the stockholders of railroad companies will be held as follows:  
*Carthage & Adirondack*, special meeting, 160 Broadway, New York, Jan. 23.

*Knoxville & Ohio*, annual meeting, Knoxville, Tenn., Jan. 21, to consider the question of approving the lease of the Knoxville & Ohio to the East Tennessee, Virginia & Georgia, heretofore made in accordance with resolutions adopted by the board of directors.

*Lehigh Valley*, annual meeting, Philadelphia, Jan. 15.

*Loyalsock*, annual meeting, Philadelphia, Jan. 14.

*Mine Hill & Schuylkill Haven*, annual meeting, Philadelphia, Jan. 14.

*New York, Ontario & Western*, annual meeting, 16 Exchange Place, New York, Jan. 16.

*North Pennsylvania*, annual meeting, Philadelphia, Jan. 14.

*Pennsylvania & New York Canal & Railroad Co.*, annual meeting, Philadelphia, Jan. 14.

*Philadelphia & Baltimore Central*, annual meeting, Philadelphia, Pa., Jan. 14.

*Philadelphia, Wilmington & Baltimore*, annual meeting, Wilmington, Del., Jan. 14.

*Philadelphia & Reading*, annual meeting, Philadelphia, Pa., Jan. 14.

*Pittsburgh & Lake Erie*, annual meeting, Pittsburgh, Pa., Jan. 22.

*St. Catharines & Niagara Central*, annual meeting, Montreal, Jan. 28.

*Sheffield Terminal Company*, annual meeting, Sheffield, Ala., Jan. 31.

*Western New York & Pennsylvania*, annual meeting, Philadelphia, Jan. 14.

###### Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

*The Association of American Railway Accounting Officers* meets at the Southern Hotel, St. Louis, Mo., Jan. 24, 1889.

*The American Association of Railway Chemists* will hold its next meeting in Baltimore, Md., Jan. 14, 15 and 16.

*The American Institute of Mining Engineers* will hold its nineteenth annual meeting in New York City, Feb. 19. The hotel headquarters will be at the Union Square Hotel.

*The National Association of Railway Surgeons* holds its annual convention in St. Louis, Mo., May 2, 1889.

*The New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

*The Western Railway Club* holds regular meetings on the third Tuesday in each month at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

*The New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

*The Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

*The American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street New York.

*The Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.

*The Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

*The Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

*The Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

*The Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m. at its rooms in the Penn Building, Pittsburgh, Pa.

*The Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

*The Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

*The Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m. on the third Saturday in each month.

###### New Securities Listed.

The Governing Committee of the New York Stock Exchange has listed the following railroad securities:

*Western New York & Pennsylvania*, \$200,000 additional first mortgage 5 per cent. gold bonds, making total \$8,400,000, running to 1937.

*Northern Pacific & Montana*, \$160,000 additional first mortgage 7 per cent. gold bonds, making total issue \$3,131,000.

*Prescott & Arizona Central*, \$775,000 first mortgage 6 per cent. sinking fund gold bonds and \$775,000 second mortgage income bonds, each to run until 1916.

*Colorado Midland*, \$6,250,000 first mortgage 6 per cent. 50 year gold bonds.

*Denver, Texas & Fort Worth*, \$18,000,000 Mercantile Trust Co.'s voting trustees' certificates (180,000 shares, par of \$100), representing the outstanding capital stock of the company, which are deposited with the Mercantile Trust Co. The holders of these certificates are entitled to receive all dividends on the stock, and the trust is made for the purpose of carrying out a traffic agreement with the Denver & Rio Grande.

*Chicago, St. Paul & Kansas City*, \$766,000 additional first mortgage 5 per cent. gold bonds, making a total of \$9,068,000.

*Duluth & Iron Range*, \$764,000 additional first mortgage 5 per cent. coupon bonds and registered bonds convertible into said coupon bonds, making total issue \$4,264,000.

*Iowa Central*, \$5,900,000 first mortgage 5 per cent. gold bonds and \$5,600,000 preferred stock; Mercantile Trust Co.'s receipts for Central Iowa first mortgage 7 per cent., 1899; Eastern Division first 6 per cent.; Illinois Division first 6 per cent., and consolidated gold bonds to be stricken from the list, for the purpose of carrying out the plan of adjustment with Reorganization Committee.

*Central Ohio*, as reorganized, \$1,000,000 consolidated first mortgage  $4\frac{1}{2}$  per cent. gold bonds, total authorized issue to be \$2,850,000, to run until 1930, the Mercantile Trust & Deposit Co., of Baltimore, trustee; the road is under lease to and is operated by the Baltimore & Ohio.

*American Institute of Mining Engineers.*

The fifty-third meeting of the Institute, being the nineteenth annual meeting, will be held in New York City, beginning Tuesday evening, Feb. 19, 1889. Hotel headquar-



ters will be at the Union Square Hotel. The Chairman of the Local Committee is Mr. Andrew Carnegie, and the Secretary, to whom communications concerning the sessions, arrangements, rooms, etc., should be addressed, is Mr. William H. Wiley, 15 Astor place.

The following programme is provisionally announced, subject to additions of detail, and possibly (but not probably) to changes of the order and dates now given:

Tuesday evening, Feb. 19.—Opening session.  
Wednesday—General excursion to the Spiral Weld Tube Works and the Edison Laboratory, at East Orange, N. J., with a session at the Edison Laboratory, devoted to the Applications of Electricity in Mining. A paper is promised from Mr. Edison. The same evening session will be devoted to papers and discussions connected with iron and steel.

Thursday—Sessions at which, if the Council so decide, the subjects of the Wednesday evening session may be continued. At the afternoon session the election of officers and other business will be transacted. In the evening, subscription dinner.

Friday—Numerous local excursions, in parties, according to the preferences of individual members. Evening—Social reception.

Saturday—Local excursions.

Mr. R. P. Rothwell, Editor of the *Engineering and Mining Journal*, has special charge of the programme of the session of Wednesday, devoted to Electricity in Mining and Mr. Charles Kirchhoff, Jr., Editor of the *Iron Age*, has special charge of the programme of the session or sessions devoted to Iron and Steel.

#### American Society of Civil Engineers.

The annual meeting of the society will be held Jan. 16 and 17, 1889, at the Society House.

Wednesday, Jan. 16.—The meeting will open at 10 o'clock, and will continue through the day. Lunch will be served at the Society House at 13.30 o'clock.

During the meeting the annual reports will be presented, officers for the ensuing year elected, the awards of the Normal Medal and of the Rowland Prize for the past year announced, the place for the next convention considered; reports from various committees presented and discussed; technical subjects discussed; general business transacted.

Thursday, Jan. 17.—The arrangements for this day will be announced in detail at or soon before the meeting. They will include visits to a number of points of engineering interest.

In the evening a reception for gentlemen will be held at the house of the society, and at 21.30 o'clock supper will be served.

At the meeting of Jan. 2, the following were elected:

Members.—Winthrop Bartlett, St. Louis, Mo.; Charles Addison Ferry, New Haven, Conn.; John Leland Fitzgerald, Schenectady, N. Y.; Charles Wingate Gibbs, Silverton, Col.; Ed. Adino Handy, Cleveland, O.; Geo. Alex. Keefer, Victoria, B. C.; James Warren Pearl, Canton, O.; John Charles Quintus, Erie, Pa.; Lewis Frederick Rice, Boston, Mass.; William Benson Storey, Carbondale, Wash. Ty.; William Henry Wentworth, Monterey, Mex.

Associate.—John Elfreth Watkins, Washington, D. C.

Juniors.—Ysidori Ygnacio Polledo, Cardenas, Cuba; Charles St. John Warner, New York City.

#### Illinois Society of Engineers and Surveyors.

The fourth annual meeting of this society will be held in the City Hall at Bloomington, Ill., commencing Wednesday afternoon, Jan. 23, and continuing Jan. 24 and 25.

Besides the reports of the standing committees, the following are among the papers that will be presented:

President's Address; Drainage Areas, and Their Drainage Discharge, C. G. Elliott, Gilman; Railroad Engineering, E. A. Hill, Cincinnati; Progress of the Cairo Bridge, S. F. Balcom, Champaign; Methods of Measuring and Computing Earthwork, E. L. Morse, Cazenovia; The Metric System, S. S. Greeley, Chicago; Levee Construction, E. J. Chamberlain, Engineer, Sny Island Drainage District, Pittsfield; A Topographical Survey, E. J. Cautine, Bloomington; A Report to the Committee on Municipal Engineering, A. H. Bell, City Engineer, Bloomington; Electric Lighting in Small Cities, James H. Garrett, Electrical Engineer, Chicago; The Sources of the Water Supply of the City of Springfield, S. A. Bullard, Springfield; Sources of Water Supply and their Development, W. D. Mead, City Engineer, Rockford; Specifications, W. D. Clark, City Engineer, Springfield; Problems in Surveying, D. L. Brancher, Lincoln; Sewage Disposal, A. N. Talbot, Champaign; Assessments, H. A. Stevens, Chicago; By what Rules of Law are Course, Distance and Area Governed in the Subdivision of the Government Section? Z. A. Enos, Springfield; Geodetic Surveying, I. O. Baker, Champaign; Surveying and Drainage, H. C. Niles, Tuscola; A New Mexico Coal Mine, G. W. Richards, Carthage, N. M.; Mining Engineering Topic, A. C. Brancher, Lincoln; The Use of Electricity in Mining, Prof. T. B. Comstock, Champaign; The Causes of Railroad Accidents, S. F. Balcom, Champaign.

In addition to the papers above mentioned a new feature will be introduced—that of topical discussions. Each topic has been sent to two or more members, who will give in reply their opinion, judgment, experience or custom. The subjects include superintendence of work, size of drainage pipe, riveted or pin connected bridges, brick as a material for engineering construction, inspection of highway bridges, thickness of cover stones for box culverts, sewer ventilation, premium system for excellence in track work, etc.

There will be an exhibit and exchange of plans of engineering work of all kinds. This proved to be an interesting feature last year, and will not be less so at the next meeting.

Hotels will give reduced rates. For further information address A. N. Talbot, Executive Secretary, Champaign, Ill.

#### Montana Society of Civil Engineers.

A regular meeting was held Dec. 15. The consideration of the report of the committee on overhead crossings for the motor line in Helena was taken up as unfinished business. The report was discussed at length, but no definite conclusion was arrived at.

A committee was appointed to make arrangements for the annual meeting to be held Jan. 19. At a subsequent meeting it was decided to hold this meeting at Butte, for the examination of mines and other matters of engineering interest. An evening session will be held, at which the officers will be installed and professional papers read.

#### New England Water-Works Association.

An adjourned meeting of this association will be held at Young's Hotel, Boston, Mass., on Wednesday, Jan. 16, 1889. Members of water boards are cordially invited to be present.

The programme is as follows: 11 o'clock, the rooms will be open for the use of the members; 12.30 o'clock, meeting of the Executive Committee to consider any business that may require attention; 1 o'clock, lunch will be served promptly at this hour; 2 o'clock, general business.

The paper presented by William B. Sherman, C. E., at the last meeting, "What is the safe ratio of pumping capacity to maximum consumption?" will be discussed. This paper appears in the December number of the *Journal*. All mem-

bers are invited to come prepared to participate in the discussion.

This discussion is to be followed by a series of very brief papers in accordance with the agreement made by a number of the members at the last meeting. These papers will consist of a short statement of some personal experience or observation. As each topic is to be selected by the writer thereof, there will probably be quite a variety of subjects presented.

#### Western Railway Club.

The club will hold its next meeting on Tuesday, Jan. 15, at 2 p. m., in the Phenix building (Jackson street, opposite Grand Pacific Hotel), Chicago. The subjects for discussion are: 1. "Can there be an Absolutely Anti-frictional Metal Made for Journal Bearings to Prevent the Heating of Same under Ordinary Circumstances?" 2. "Heating Cars by Steam."

Mr. J. H. Setchel, of Dunkirk, N. Y., will read a paper on this topic, entitled, "Continuous Steam Heat for Railway Trains. Its Advantages Considered and Objections Removed." Mr. W. L. Johnson, of Milwaukee, will read a paper upon the same topic, entitled "The Essential Elements of Steam Heating."

#### PERSONAL.

—President Bennett H. Young, of the Louisville Southern, has resigned, and Theodore Harris, Vice-President, has been elected in his place.

—The office of Commercial Agent of the Baltimore & Ohio, in Philadelphia, which has been filled by Capt. John Weeks, has been abolished.

—Mr. Henry C. Murrell, formerly a director and one of the largest stockholders in the Louisville & Nashville, died in Louisville last Sunday.

—Mr. Samuel J. Potts, who was Passenger and Freight Agent of the Philadelphia & Reading at Reading from 1847 to 1867, died in Reading last week, aged 84 years.

—Col. Albert Jewett, aged 65 years, Superintendent of the Seneca Falls & Waterloo road, died at Waterloo, N. Y., Jan. 3, of Bright's disease. He was born in Hartford, Conn.

—It is generally understood that Thomas M. King will return to the service of the Baltimore & Ohio as Vice-President, and that he will have supervision of the Philadelphia division.

—Mr. S. B. Opdyke, Jr., has resigned the position of Engineer in charge of Bridges on the New York, New Haven & Hartford Railroad. It is understood that he is to be Superintendent of the Hartford & Connecticut Western.

—Mr. L. B. Paxson, who has had charge of the mechanical department of the Philadelphia & Reading since the resignation of Mr. G. W. Cushing last July, has been appointed Superintendent of Motive Power and Rolling Equipment.

—Mr. E. W. Muencher has resigned his position as Chief Engineer of the Chicago, St. Louis & Paducah road, and has returned to Manistee, Mich. The road is now completed, and is operated as a division of the St. Louis, Alton & Terre Haute road.

—Mr. Joseph H. Sherrard, aged 88 years, died at Winchester, Va., this week. He was Cashier of the Farmers' Bank of Winchester for many years before the war, and has been President of the Winchester & Potomac Railroad for many years.

—Mr. M. R. Moran, General Superintendent of the Jacksonville, Tampa & Key West, has tendered his resignation, which has been accepted. He has been connected with the road since 1883 in various capacities, and was previously Superintendent of the New London Northern.

—Mr. H. J. Page, whose resignation as General Freight Agent of the Cincinnati, Indianapolis, St. Louis & Chicago, we mentioned last week, has accepted the position of Traffic Manager of the Elgin, Joliet & Eastern and the Gardner, Coal City & Northern roads, with headquarters at Chicago, and J. T. Harner, Assistant General Freight Agent of the Atchison, Topeka & Santa Fe, has been appointed Auditor of both roads.

—Mr. H. G. Allis, Comptroller, and assistant to the President of the St. Louis, Arkansas & Texas, has severed his connection with the road. Mr. Allis has been Comptroller of this road since June, 1886, and was previously Auditor of the Little Rock & Fort Smith and other roads. On his retirement his associates in the general offices gave him a solid silver tea and coffee service and a dinner and dessert service. The sets were richly chased, and each article bore the initials of the recipient.

—Mr. B. E. Haud has been appointed Assistant General Freight Agent of the Michigan Central in place of A. W. Street, resigned. He entered railroad service Oct. 1, 1862, in the general freight department of the Galena & Chicago Union road, and has since been connected with several roads in the passenger and freight departments. He has been Assistant General Freight Agent of the Wisconsin Central, and has lately been Division Freight Agent at Chicago, of the Cincinnati, Indianapolis, St. Louis & Chicago.

—Mr. George H. Kimball, Superintendent of the eastern division of the New York, Chicago & St. Louis, has tendered his resignation after six years' service in that position. Mr. Kimball was for five years after 1871 connected with the engineering departments of various roads, and in 1876 he became Superintendent of Bridges and Buildings of the Pittsburgh, Cincinnati & St. Louis, which place he held until 1879, when he was appointed Engineer of Maintenance of Way on the Little Miami.

—Mr. Charles M. Heald has been chosen President of the New York, Susquehanna & Western. Mr. Heald has been General Freight Agent of the Philadelphia & Reading, and is a comparatively young man, of marked ability and experience as a traffic manager. He came to the Philadelphia & Reading from the Long Island, resigning the office of General Traffic Manager of that road in November, 1886, to accept the position of Superintendent of the Philadelphia & Reading Express Co. In February, 1887, he was appointed Assistant to the General Manager of the railroad, and later he was made General Freight Agent. Mr. B. H. Bail, Assistant General Freight Agent, has been appointed Acting General Freight Agent, to succeed Mr. Heald.

#### ELECTIONS AND APPOINTMENTS.

*American Live Stock Express Co.*—F. W. Coolbaugh has been appointed Secretary of this company, with office at 45 Broadway, New York.

*Americus, Preston & Lumpkin.*—The officers of this company are now as follows: R. E. Hardaway, Superintendent; M. B. Suber, Acting General Freight and Passenger Agent; W. E. Hawkins, Soliciting and Traffic Agent; S. C. Cooper, Secretary and Treasurer; J. B. Latimer, Auditor and Passenger Agent; and B. H. Ward, Manager of the Boat Line, with office at Brunswick, Ga. The general offices are at Americus, Ga.

*Atchison, Topeka & Santa Fe.*—L. H. Waugh has been appointed Master Mechanic of the Western Division, with headquarters at La Junta, Col., vice J. M. Lucky, resigned.

*Austin & Northwestern.*—H. L. Higdon, for the past two years Chief Engineer of the road with headquarters at Burnet, Tex., has resigned to accept a position on the Victoria branch of the Southern Pacific, and W. J. Clayborne, of Chicago, has been appointed his successor.

*Baltimore & Cumberland Valley Extension.*—At the annual meeting of the stockholders of the company, held this week, the following officers were elected: President, David Wills; Treasurer, D. J. Foley; Secretary, T. M. Mahon; Directors, D. J. Foley, J. M. Hood, George B. Cole, John P. Culbertson, William L. Chambers, J. W. Humbird, and C. W. Humrichouse.

*Baltimore & Drum Point.*—The officers of this company are: August Albert, President; Andrew Banks, Treasurer, and H. A. Albert, Secretary, with office at Baltimore, Md.

*Baltimore & Eastern Shore.*—The Wicomico & Pocomoke road, being under the control and management of this company, A. J. Benjamin has charge of the freight and passenger business and accounts as Assistant Secretary and Treasurer, with office at Salisbury, Md. R. J. Henry has been appointed General Superintendent of the Wicomico & Pocomoke Division. The other officers of the road are as follows: Joseph B. Seth, President; Theophilus Tunis, Secretary, and E. E. Jackson, Treasurer.

*Cairo, Vincennes & Chicago.*—The freight and passenger departments of this line have been separated, J. J. Fletcher remaining in charge of the freight department as General Freight Agent. C. S. Elliott has been appointed General Passenger Agent, with office at Cairo.

*Canada & St. Louis.*—F. K. Holtzinger has been appointed General Freight and Passenger Agent, and J. S. Keefe Assistant General Freight and Passenger Agent, with headquarters at Goshen, Ind. J. J. Burns is General Manager, with office at Battle Creek, Mich.

*Central Arizona.*—The following are the officers of this road, formerly the Arizona Mineral Belt: F. E. Hinkley, President; D. M. Riordan, Vice-President and General Manager; Frank McPherson, Superintendent; T. A. Riordan, General Freight Agent; F. W. Sisson, General Ticket Agent and Auditor; Fred. Riley, Chief Engineer, and T. G. Norris, Attorney and Solicitor. The general offices are at Flagstaff, Ariz.

*Central Railroad & Banking Co. (Georgia).*—The company this week elected the following new board of directors: E. P. Alexander, H. M. Comer, J. Raney, W. W. Gordon, W. S. Chisholm, J. K. Garnett, E. M. Green and A. V. Vetsburg, of Savannah; C. H. Phinizy, of Augusta; Patrick Calhoun, S. M. Inman and H. T. Inman, of Atlanta, and John C. Calhoun, of New York.

*Chesapeake & Ohio.*—The appointment of W. J. McKee to be Chief Train Dispatcher of the new Maysville & Big Sandy division at Maysville, Ky., has been announced.

*Chicago, Burlington & Quincy.*—J. H. Palmer has been appointed General Agent of this road and the St. Louis, Keokuk & Northwestern at St. Louis, vice J. T. Ripley, resigned.

*Chicago, Kansas & Nebraska.*—Clinton Jones has been appointed General Agent for the passenger department of this company, with office at San Francisco, Cal. F. W. Thompson has been appointed Traveling Passenger Agent, with office at Los Angeles, Cal. C. Kennedy has been appointed General Agent for the passenger department, with office at Portland, Ore.

G. F. Lee has been appointed General Agent of the passenger department, with headquarters at Denver, Col.

*Chowan & Southern.*—The officers of this company are as follows: George S. Scott, President, New York; G. M. Surpell, General Manager; E. Allen Jones, Chief Engineer; C. G. Elliott, Treasurer; W. G. Elliott, Secretary and Council, and John T. Reid, Jr., Acting Auditor. The general offices are at Norfolk, Va.

*Cincinnati, Indianapolis, St. Louis & Chicago.*—H. J. Page having resigned as General Freight Agent, all matters pertaining to the General Freight Agent's office should be addressed to L. R. Brockenbrough, Assistant General Freight Agent.

*Cleveland, Akron & Columbus.*—H. B. Dunham is now General Passenger Agent of this company, with office at Akron, O., vice C. O. Wood, resigned.

*Columbus, Hocking Valley & Toledo.*—At the annual meeting held at Columbus, Ohio, the directors of the road were re-elected with the exception of Charles B. Alexander, of New York, who succeeds to the vacancy caused by the death of Charles Crocker.

*Columbus & Xenia.*—The officers and directors chosen at the recent annual meeting are: Henry C. Noble, Geo. M. Parsons, John W. Andrews, P. W. Huntington, R. A. Harrison, Alfred Thomas, W. B. Hayden, Robert S. Smith, James Andrew Swan, Henry Hanna, C. P. Cassilly and Thomas D. Messler. Henry C. Noble was elected President and Robert S. Smith, Treasurer.

*Denison & Washita Valley.*—The annual election of the stockholders of the road was held in Denison, Tex., last week, and the following directors were elected: W. B. Munson, J. F. Munson, S. Hanna, J. C. Field, S. Star, Edward Perry and J. B. McDougall. The directors elected the following officers: President, W. B. Munson; Vice-President, E. Perry; Secretary, H. V. Perry; Treasurer, J. T. Munson.

*Duluth & Iron Range.*—I. P. Beck, having resigned the position of Local Treasurer of this company, the title has been abolished. F. H. White has been appointed Cashier and Paymaster, with headquarters at Duluth, and will perform all the duties heretofore performed by Mr. Beck.

*East Tennessee, Virginia & Georgia.*—Samuel H. Hardwick, Eastern Passenger Agent at New York, has been appointed Assistant General Passenger Agent, with office at Atlanta, Ga., and L. J. Ellis will be transferred to succeed Mr. Hardwick as General Eastern Passenger Agent.

C. A. Baird has been appointed Florida Passenger Agent, with headquarters at Jacksonville, Fla., vice B. H. Hopkins, resigned.

*Elgin, Joliet & Eastern.*—The officers of this company and the Gardner, Coal City & Northern are as follows: Norman Williams, President; F. E. Worcester, Vice-President and General Manager; H. J. Page, Traffic Manager; F. D. Raymond, Assistant Treasurer; J. T. Harner, Auditor; A. D. Wheeler, Solicitor; L. B. Jackson, Chief Engineer; G. O. Clinton, Superintendent; W. C. Cowgill, General Freight and Passenger Agent. Offices at Royal Insurance Building, Chicago, Ill.

*Evansville & Northern.*—Among the incorporators of this Indiana road are: John Kuhn, William Field, T. R. McPherson, H. M. Sweetser, Robert Ruston and Allen Gray, of Evansville, Ind.



**Full Brook Coal Co.'s Roads.**—The board of managers have elected the following officers: John Lang, First Vice-President and Treasurer; Daniel Beach, Second Vice-President and Counsel, and John H. Lang, Secretary and Assistant Treasurer.

**Grand Tower & Cape Girardeau.**—The incorporators and first board of directors are: E. A. Hitchcock, St. Louis; Thomas F. Wheeler, Cape Girardeau, Mo.; W. W. Barr and J. D. Peters, of Carbondale, and B. B. Browley, of Grand Tower.

**Green River.**—The trustees of this company are: T. F. Thompson, Ira A. Town, C. H. French, T. L. Nixon and John Woodin.

**Kanawha.**—The officers of this company are as follows: George W. Shonk, Secretary and Treasurer, Plymouth, Pa.; F. L. Garrison, Superintendent, Coalburg, W. Va., and G. Macfarlane, Coal Agent, Louisville, Ky.

**Kansas City & Pacific.**—The officers of this company are now as follows: R. S. Stevens, President, Attica, N. Y.; W. H. Woolverton, First Vice-President, New York City; C. H. Kimball, Second Vice-President and General Solicitor; Lee Clark, Secretary and Treasurer, and T. Penfield, General Manager. The general offices are at Parsons, Kan.

**Kildare & Linden.**—The officers of this company are as follows: J. H. Bemis, President; G. W. Howell, Vice-President, Atchison, Kan.; C. F. Bemis, Secretary and Treasurer; W. N. Bemis, General Freight and Passenger Agent. The general offices are at Jefferson, Tex.

**Kings County Elevated.**—The company has elected the following directors: James Jourdan, Wendell Goodwin, E. A. Abbott, James O. Sheldon, H. J. Davison, Harvey Farrington, William A. Read, S. Newton Smith and Henry J. Robinson.

**Lake Shore & Michigan Southern.**—The following appointments of Roadmasters have been announced: J. Brew, Chicago Division, from Chicago to Chesterton, with office at Englewood, Ill., vice C. Stein, transferred; C. Stein, Lansing and Ypsilanti branches, with office at Hillsdale, Mich., vice A. Storms, transferred; A. Storms, Fort Wayne branch, with office at Hillsdale, vice John Wirley, transferred; John Wirley, Kalamazoo Division, with office at Kalamazoo, vice D. B. Kyle, Assistant Roadmaster, transferred.

**Lancaster & Hamden.**—The company held its annual meeting at Lancaster, O., this week, and the following officers and board of directors were elected: President, John G. Reeves; Vice President, Theodore Mithoff; Secretary, Benjamin F. Dam; Treasurer, Philip Rising; Directors, James H. Ballard, William H. Mowery, John T. Ogiers, William B. MacCraden, J. H. Axline, P. W. Bininger, and Thomas R. Tarpey.

**Lancaster & Reading.**—The stockholders of the company this week elected the following board of directors: A. H. Peacock, John D. Skiles, John R. Bitner, John Keller, George M. Franklin, C. Geiger, B. F. Breneman, William Leaman, George W. Hensel, Daniel D. Hess, Robert Montgomery, Daniel Herr and Daniel Bair. The board organized by electing A. H. Peacock President and William Leaman Secretary and Treasurer.

**Long Island.**—G. F. Chichester has been appointed General Baggage Agent, with office at Long Island City.

**Louisville & Nashville.**—B. F. Dickson, Principal Assistant Engineer, has been appointed Assistant Superintendent of the South and North and Birmingham Mineral divisions, at Birmingham, Ala., vice W. M. Newbold, promoted.

**Louisville Southern.**—Col. Bennett H. Young has resigned the Presidency, and the directors have elected Vice-President Theodore Harris, of Louisville, to succeed him.

**Mason City & Fort Dodge.**—R. W. Eager has been appointed Auditor and Cashier of this company, vice W. L. Newport, resigned.

**Michigan Central.**—B. E. Hand has been appointed Assistant General Freight Agent of the road, with office in Chicago, in place of A. W. Street, resigned.

**Missouri, Kansas & Texas.**—C. N. Stevens is now Purchasing Agent, with office at Sedalia, Mo.

**Missouri Pacific.**—The title of W. E. Hoyt has been made that of General Eastern Passenger Agent, and of H. C. Logan General Eastern Freight Agent. G. K. Delahanty has been appointed New England Passenger Agent, taking the place of A. H. Torricello, and H. L. Chapman, New England Freight Agent, in place of L. E. Chalenon.

**Nevada Central.**—C. W. Hinchliffe has been appointed Superintendent, and the road taken out of the Receiver's hands.

**New Haven & Northampton.**—At the annual meeting of the stockholders of the road, the following directors were elected: Charles N. Yeamans, G. J. Brush, Daniel Trowbridge, G. H. Waterous, E. H. Trowbridge, E. N. Reed and Charles P. Clark, all of New Haven, Conn.; C. M. Pond, of Hartford, Conn., and H. G. Knight, of Easthampton, Mass.

**New York, Mahoning & Western.**—The annual meeting of the stockholders of the road was held in Findlay, O., Jan. 7, and the following board of directors was chosen: William Thorpe, Davis Johnson, New York City; C. N. Haskell, Findlay; Theodore L. Frothingham, New York City; W. A. Armstrong and W. H. Harris, Toledo; George E. Blaine, Dayton. The directors elected officers as follows: President, Davis Johnson; Vice-President, George E. Blaine; Treasurer, Theodore L. Frothingham; Secretary, W. A. Armstrong; Attorney, W. H. Harris; General Manager, C. N. Haskell. The road has been leased to the Ohio, Indiana & Missouri River.

**New York, Susquehanna & Western.**—Charles M. Heald, General Freight Agent of the Philadelphia & Reading, has been elected President of this road, vice F. A. Potts, deceased. Simon Borg has been elected Second Vice-President.

**New York, Chicago & St. Louis.**—George H. Kimball, Superintendent of the Eastern Division, has resigned, and is succeeded by W. L. Blair.

**North American Railroad Superintendents' Association.**—C. A. Hammond, Superintendent of the Boston, Revere Beach & Lynn, is now Secretary of the association, Mr. Waterman Stone having resigned.

**Northeastern (South Carolina).**—T. G. Main has been appointed Secretary, in place of Christopher Williman, deceased. Mr. Main was previously Secretary to President Ravenal.

**Northern Pacific.**—E. R. Knowlton is now Superintendent of the Missouri Division, with office at Dickinson, Dak., vice F. Greene, who is now Superintendent of the Eastern and Western Minnesota and Wisconsin Divisions. The position of Auditor of Freight Receipts and Auditor of Passenger Receipts have been abolished, and the office of Auditor of

Traffic Receipts has been established. E. H. C. Taylor has been appointed Auditor of Traffic Receipts, and will have charge of both freight and passenger accounts, with office at St. Paul.

**Ohio, Indiana & Missouri River.**—The officers of this company, the lessee of the New York, Mahoning & Western, are as follows: Norvin Green, President; C. N. Haskell, General Manager; George E. Blaine, Superintendent.

**Oregon & Washington Territory.**—The officers of this company are as follows: G. W. Hunt, President and General Manager; J. C. Leasure, Vice-President, Pendleton, Ore.; T. B. Wilcox, Treasurer, Portland, Ore.; C. Herman, Secretary; H. H. Browning, Superintendent Express Traffic, St. Paul, Minn.; John V. Creighton, Traffic Manager; Rowland Smith, Auditor; Frank Riffe, Chief Engineer; C. W. Taylor, Trainmaster, Hunt's Junction, Wash. Ter., and W. F. Wamsley, General Superintendent. The general offices are at Walla Walla, Wash. Ter.

**Philadelphia & Reading.**—L. B. Paxson has been appointed Superintendent of Motive Power and Rolling Equipment, with office at Philadelphia, Pa. B. H. Bail, Assistant General Freight Agent, has been appointed Acting General Freight Agent to succeed C. M. Heald, resigned.

**Pullman Palace Car Co.**—The following appointments have been made: Thomas H. Wickes, the present General Superintendent, to be Second Vice-President, in control of the Operating Department. C. A. Garcelon, the present Superintendent of the Chicago Division, to be General Superintendent, vice Thomas H. Wickes, promoted. W. H. Reed, Superintendent of the Eastern Division, to be Superintendent of the Chicago Division. The Erie Division has been merged into the Eastern Division, and H. S. Billings has been appointed Superintendent, with office at No. 15 Broad street, New York. W. A. Ritchie, acting District Superintendent at Montreal, has been appointed District Superintendent.

**Raritan River.**—The officers of this company are now as follows: Edward H. Ripley, President; C. T. Hobart, Vice-President; Frank H. Earle, Secretary; W. G. Burnstead, Chief Engineer; W. D. Edwards, Attorney; M. P. Hendrickson, General Freight and Passenger Agent.

**Red River, Sabine & Western.**—The following are the officers of this Texas company: L. L. W. Lloyd, President; W. J. Swain, First Vice-President; W. E. Young, Second Vice-President; F. H. Tucker, Treasurer; I. H. Hollis, Secretary. The general office is at San Augustine, Tex.

**Reynoldsville & Falls Creek.**—The officers of this company are as follows: Fred A. Bell, President, Buffalo, N. Y.; George H. Lewis, Treasurer, Buffalo, N. Y.; Andrew Cant, Secretary, Buffalo, N. Y.; Charles Clifton, Auditor, Buffalo, N. Y.; A. G. Yates, General Freight and Passenger Agent, Rochester, N. Y.; S. B. Elliott, General Manager, and George Melinger, Superintendent. General offices are at Reynoldsville, N. Y.

**Richmond & Danville.**—Mr. Geo. D. Harris has been appointed Master Mechanic of the Western North Carolina Division and the Asheville & Spartanburg Railroad, vice G. W. Gates, resigned.

**St. Joseph, St. Louis & Santa Fe.**—C. G. Sholes has been appointed Superintendent of Telegraph, and J. K. Lape has been appointed Master Mechanic, vice M. R. Kiley, resigned.

**St. Louis, Arkansas & Texas.**—George K. Warner is acting Treasurer, vice C. D. Drake, deceased.

**St. Louis, Vandalia & Terre Haute.**—The annual meeting of the stockholders of the company was held Jan. 9, at Greenville, Ill. The directors elected were: Thomas B. Messler, J. N. McCullough, William Thaw, of Pittsburgh; W. R. McKee, of Terre Haute, Ind.; R. L. Dulaney, E. O. Staudard, Charles Seyt, A. G. Henry and J. S. Peers. The board organized by electing the following officers: Thomas D. Messler, President; S. B. Loggett, Secretary; C. D. Holmes, Assistant Secretary, and John F. Davidson, Treasurer.

**San Antonio & Aransas Pass.**—L. J. Polk, Assistant General Freight Agent, has been appointed General Freight Agent, and R. W. Andrews, Assistant General Passenger Agent.

**Surry & Smithfield.**—The incorporators have elected the following officers: R. D. Gilliam, President; William A. Warren, Vice-President, and A. P. Bohannon, Secretary and Treasurer.

**Terre Haute & Indianapolis.**—The stockholders of the company have elected the following directors: William R. McKee, Joseph Collett, D. W. Minshall, Henry Ross, John G. Williams, George E. Farrington and Hernan Hulman. Henry Ives was dropped from the list, and Mr. Hulman substituted for him.

**Texas Grand Trunk.**—The incorporators of this Texas company are: Thomas H. Wilson, Charles B. Evans, D. F. Lloyd, C. E. Jackson, of New York; E. B. Golet, C. E. Brand, A. F. Bentley, T. L. Hollingsworth, F. D. Downs, J. E. Moore, George Wilcox, A. Lewy, J. J. Nunsey, O. K. Burwitz, of Temple, Tex.; A. R. Johnston, of Marble Falls, and John C. Roberts, of Bremond. Thomas H. Wilson, of New York, is President and Charles E. Evans, of New York, is Secretary and Treasurer.

**Wheeling, Wellsburg & State Line.**—The officers are: Samuel George, President, Wellsburg, W. Va.; David Brown, Treasurer, Wellsburg, W. Va.; and A. B. Paul, Secretary, Hopedale, Ohio. These and the following are directors: J. A. Miller, C. B. Hart and Jno. S. Naylor, of Wheeling, W. Va., and Joseph Ramsey, of Cincinnati, O.

**Wichita & Western and Kingman, Pratt & Western.**—D. H. Rhodes has been appointed to the position of Superintendent and Freight and Passenger Agent, in addition to his duties as Chief Engineer, with title of Superintendent and Chief Engineer, and with headquarters at Wichita, Kan., taking effect Jan. 10, vice Frank M. Hill, resigned.

**Winona & Southwestern.**—The officers of this company are as follows: William Windom, President; H. W. Lamber-ton, Vice-President; Thomas Simpson, Secretary; M. G. Norton, Treasurer; D. M. Wheeler, Chief Engineer and Superintendent.

#### OLD AND NEW ROADS.

**New Companies Organized.**—Evansville & North-eastern.—Grand Tower & Cape Girardeau.—Nebraska, Kansas & Colorado.

**Alberta & Athabaska.**—Application is being made by this company to the Canadian Parliament for an amendment to its charter to give power to extend its road from the southern terminal point on Bow River to the international boundary line; also from its northern terminus on the Athabaska River to the Peace River.

**Anniston & Montgomery.**—The charter of this company, authorizing the construction of a road of this name, to run from Anniston to Montgomery, Ala., a distance of 110 miles, has passed the Alabama State Senate, and its passage in the House is so assured that Maj. C. C. Wrenshall of Anniston, has already taken to the field for the locating survey. The line as proposed is to run from Anniston, through Lineville, in Clay County, Alexander City, and Metemka, to Montgomery. All the money necessary has been subscribed for the building of the road, and the grading will in all probability be begun next February.

**Assiniboia, Edmonton & Urjiga.**—This company is applying for power to construct a road from Swift Current, in Assiniboia, on the line of the Canadian Pacific, in a northwesterly direction, crossing the North Saskatchewan River at or near Edmonton, thence to Peace River at or near Smoky River.

**Atchison, Topeka & Santa Fe.**—The officers of the company state that the net floating debt has not been increased, and its financial condition is better than it was three or four months ago. The Chicago terminals have cost \$5,500,000, for which bonds have been issued and sold. The total cost will be about \$6,500,000, but this money is not needed at once. The company had to advance money for fixed charges for several branch lines; but outside the Sonora interest such advances are charged to income account, not to fixed charges. This year the company by this method received \$2,000,000 for advances to Atlantic & Pacific, although it guaranteed the new bonds of the road jointly with the St. Louis & San Francisco. The Auditor is quoted as saying that with the money from the \$7,000,000 notes paid in the company will have no floating debt March 1, 1889, except these notes.

**Belleville & Lake Nipissing.**—Parliament will be asked during the session which opens Jan. 31 to grant power to this company to increase its capital stock and bonding power, and to extend the time for the commencement of work.

**Calgary, Alberta & Montana.**—This company seeks incorporation in Canada for the purpose of constructing a line from Calgary, Northwest Territory, to the international boundary line, at a point between the Rocky Mountains and the eastern boundary of Alberta.

**Canadian Pacific.**—The Secretary of this company has within the past few days had several interviews with the Canadian government regarding the 10,000,000 acres of land awarded in the Northwest as part of its contract with the government, but which have not yet been located. The government is pressing the company to make its selection, and with this object in view the company has had surveys out nearly all summer. The location of the lands will probably soon be defined.

The company is applying for additional powers for the construction and protection of its telegraph lines.

The officers of the Detroit extension of the Ontario & Quebec, will appear before the railway committee of the Privy Council at Ottawa this week to apply for permission to cross the London, Huron & Bruce branch of the Grand Trunk at Hyde Park by means of an overhead bridge. The road also wants to cross the Sarnia branch of the Grand Trunk at Caradoc, Middlesex County, Ont.

**Central Arizona.**—The Arizona Mineral Belt road, which was sold last summer at sheriff's sale under a mechanic's lien, has been reorganized under the above name. The road extends from Flagstaff, on the Atlantic & Pacific, to Fulton, Ariz., 35 miles, and a proposed extension from the latter point to Globe, Ariz., has been surveyed, as well as other lines.

**Central of New Jersey.**—New interlocking has been put in at Elizabeth Junction and at Roselle, N. J., and will be introduced at various other points. Several of the bridges on the line east of Bound Brook and on the Newark branch are to be replaced by heavier structures. The Elizabethport & Newark Branch, five miles long, has been double-tracked, giving a double-track route from Jersey City to Elizabethport, independent of the main line. A second track has also been laid between Highland Beach and Galilee, on the New York & Long Branch Division.

**Charleston, Cincinnati & Chicago.**—Holders of township bonds issued in South Carolina to this road have begun proceedings to test the recent township bond decision of the Supreme Court and the Validating act passed by the Legislature at its recent session. A petition has been filed in the Supreme Court of South Carolina for a mandamus to compel the chairman of the County Commissioners of York County and his associates to allow the bonds issued by Broad River township to the railroad company. This case raises a test question which applies to four other townships in York County and three in Lancaster, as well as the one named above. The road has been completed through these townships, but before the railroad can obtain the bonds, now in the custody of the Boston Safe Deposit & Trust Co., a certificate of the fact of completion signed by the chairman and clerk of the Board of County Commissioners is necessary, and Chairman Whitesides refuses to do this until the court decides the bearing and effect of the recently passed Validating act. It is stated that applications for mandamuses in other cases in which still other uses may be tested will be filed.

**Cheraw & Barnwell.**—Chartered in South Carolina to build a road through the counties of Chester, Kershaw, Richland, Lexington, Aiken, Orangeburg and Barnwell, to such points on the Savannah River in the county of Barnwell as may be determined; also a line from Cheraw to the North Carolina line, in the county of Chesterfield. The capital stock is \$100,000.

**Chicago & Atlantic.**—It is said that the road is to be double-tracked from Hammond, Ind., to Huntington, Ind., 120 miles, to afford better facilities for handling the steadily increasing traffic of the road at the Chicago end of the line, and also to afford increased facilities to the Wabash Western, which uses the tracks of the road from Chicago to Laketon, Ind.

**Chignecto Ship.**—This company will hold a special general meeting at its offices in London, England, Jan. 16, for the purpose of submitting for the approval and sanction of shareholders the issue of £700,000 (sterling) first mortgage bonds, and of securing such bonds by a mortgage deed.

**Chowan & Southern.**—The road has been completed, and is now in operation from Norfolk and Portsmouth, Va., southwesterly to Beach Grove, a distance of 15 miles. The section between Beach Grove and Tunis, N. C., on the Chowan River, a distance of 34 miles, the contractors are still at work upon. The division from Tunis southwest to Tarborough, N. C., on the Wilmington & Weldon and Albemarle & Raleigh divisions of the Atlantic Coast Line, is in operation from Tunis to Mulander, near the Roanoke River, 18 miles; the section from Mulander to Tarborough, a distance of 33 miles, is still under construction. Harper, Bruce & Co., of Suffolk, Va., are the contractors. The line when completed, will extend from Norfolk, Va., to Tarborough, N. C.,



and will give the Atlantic Coast Line and Richmond & Danville system a new entrance into Norfolk.

**Concord.**—At a recent session of the commission appointed to ascertain the interest of the state of New Hampshire in the Concord and Boston & Maine roads, the proposition of Austin Corbin, of New York, R. K. Dow and J. L. Howard, of Claremont, in 1887, was renewed. It is to pay the state \$500,000 for the state interest in the Concord, an additional stipulation being that the road is not to be paralleled. The counsel for the Concord road objected to the consideration of the proposition, and asserted that its acceptance would virtually place the state in the attitude of a stockbroker. The commissioners decided to investigate the facts in the case in order to report them to the Legislature, and have taken a recess until the middle of January, when testimony will be heard.

**Denison & Washita Valley.**—It is stated that the arrangements have been completed by the President, W. B. Munson, with a company in New York, by which the building of the road will soon begin. The road is to extend from Denison, Tex., to coal fields at Lehigh, Ind. Ter.

**Denver & Rio Grande.**—The company has let to McMurtrie & Streeter, of Denver, Col., a contract for the grading of 25 miles westward from Greenwood Springs, Col. This extension will parallel the Colorado Midland for the short distance to New Castle, and will then continue westward as far as Rifle Creek. Considerable of the work is heavy.

**Denver, Texas & Fort Worth.**—The suit of Max J. Mayer against the above road, the Colorado & Texas Construction Co., Panhandle Construction Co., and Mercantile Trust Co., to restrain the issue of \$1,000,000 of this company's bonds, has been removed from the New York State Supreme Court to the United States Circuit Court. The plaintiff is a stockholder in the Panhandle Construction Co., which contracted to build and equip a road from a point 195 miles north of Fort Worth, Tex., to the Texas line. The track was to be built in order to complete the system from Denver to Fort Worth. The construction company was to receive in return for building the track \$15,000 of the bonds and \$20,000 of the common stock of the system. The Fort Worth & Denver City road paid its share, but the Denver, Texas & Fort Worth, it is alleged, attempted to pay with a portion of the \$1,000,000 bonds issued to pay for building a third track over the narrow gauge Denver & Rio Grande railroad between Denver and Trinidad, Col. The plaintiff alleges that the cost of making this stretch a standard gauge road was only \$460,000, and that the issue of \$1,000,000 is, therefore, illegal.

**Evansville & Northern.**—Articles of incorporation have been filed in Indiana for this road, which is to extend from Evansville, Ind., to Mount Carmel, Ill., connecting at the latter point with the Cairo, Vincennes & Chicago. A construction company has been organized and \$100,000 capital subscribed for the building of the road.

**Evansville & Richmond.**—The grading of this Indiana line is now completed and ready for tracklaying between Elmore and Oden, two-thirds of its entire length, and tracklaying will be begun at once.

**Frankford & Holmesburg.**—The Pennsylvania refuses to pay the interest on the Frankford & Holmesburg 7 per cent. bonds. The road is a little more than four miles long, and has outstanding \$50,000 in 7 per cent. bonds, and \$100,000 in stock. It was leased to the Philadelphia & Trenton shortly after its completion in 1871, for ten years, and the Pennsylvania undertook the obligation when it leased the New Jersey roads. Under the lease the company is obliged to pay the interest only if earned. Heretofore it has been paid regularly. It is said that the road does not earn anything at all. The Pennsylvania owns all the bonds except \$10,000.

**Geneva, Ithaca & Sayre.**—The Lehigh Valley has declined to pay the January interest on the Ithaca & Athens first mortgage 7 per cent. bonds, which will be purchased at par by the Investment Co., of Philadelphia, until March 1. The latter company requires the bondholders selling their coupons to sign a bill of sale to the Investment Co. assigning their right of claim against the Ithaca & Athens. This is believed to be preparatory to the taking of legal proceedings looking to a foreclosure of the Geneva, Ithaca & Sayre. The indebtedness of the latter road is as follows: First mortgage 7 per cent. bonds, Ithaca & Athens, \$800,000; on main line and branches, first mortgage bonds, \$750,000; stock, \$1,675,000. Besides the above, it is said, the road owes the Lehigh Valley about \$350,000 for advances made to it. In 1887 the net earnings were only barely sufficient to meet the \$600,000 bonds of the Ithaca & Athens, and last year the earnings were not half enough to meet even this interest. The Geneva, Ithaca & Sayre extends from Geneva, N. Y., to the Pennsylvania state line, a distance of 75 miles, and it operates 116 miles of road.

**Georgia Pacific.**—Work on the Western extension in Mississippi is being rapidly pushed. The road is completed between Columbus and West Point, a distance of 25 miles, and trains are running regularly over it. West of West Point track has been laid a distance of 20 miles toward the Mississippi River. Beyond Winona tracklaying is progressing rapidly. The contractors expect to have the entire extension, 135 miles in length, completed by March 31.

**Grand Tower & Cape Girardeau.**—Articles of incorporation have been recorded in Illinois to build a road from Grand Tower, Jackson County, to a point in Alexander County on the east bank of the Mississippi River opposite the City of Cape Girardeau, Mo. The principal office will be located at Grand Tower, Jackson County, Ill., and the capital stock is \$500,000.

**Grand Trunk.**—At the coming session of the Canadian Parliament this company will apply for power to build a branch from Stoney Creek Station, Ont., on the main line of the Great Western Division, to the main line of the Northern & Northwestern Division near Hamilton Beach. The effect of this will be that trains will not go through Hamilton with traffic passing between Toronto and Suspension Bridge.

**Green River.**—This company has filed articles of incorporation in Washington Territory to build a road from the Green River Hot Springs through the town of slaughter to tide-water on Puget Sound, and to own and operate coal and other mines. The capital stock is placed at \$500,000. The distance is about 25 miles. The Hot Springs have already acquired fame as a health resort, while the line traverses rich coal deposits and forests of excellent timber.

**Hammond River & Moncton.**—This company seeks incorporation for the purpose of constructing a line of road from a point on the Central Railroad, near Hammond River, New Brunswick, to connect with the Buctouche & Moncton at Moncton, and to connect that road with the Central, Petitcodiac & Elgin, Intercolonial and Albert railroads; also with power to construct a branch line to connect with the Albert Southern road.

**Hereford.**—Tracklaying on this short Canadian road has now been completed from the International boundary near West Stewartstown, N. H., through Hereford to Cookshire, Que., on the International division of the Canadian Pacific. The road connects at West Stewartstown with the Upper Coxa road.

**Kentucky Midland.**—Tracklaying on this road was commenced at Frankfort, Ky., Jan. 4, and is now in progress. The construction of the road toward Paris, Ky., and the mountains of Eastern Kentucky will now be rapidly pushed. Mason, Gooch, Hoge & Co., of Frankfort, Ky., are the contractors.

**Kentucky & Tennessee Construction Co.**—This company has been organized at Henderson, Ky., for building the Henderson State Line road and the Bowling Green & Northern Road. The directors are, L. M. Rice, M. J. Bray, Jr., A. S. Winstead, David Banks, Jr., Malcolm Yeaman, E. Dudley Walker, T. C. Carson, J. E. Williamson. L. M. Rice was elected President.

**Kildare & Linden.**—This road has been opened for traffic from Kildare westward to Linden, Tex., a distance of 18 miles.

**Lehigh Valley.**—This company is building five piers in Jersey City on the north side of the new passenger station of the Central of New Jersey. Each pier will be 600 ft. long by 75 ft. wide, and covered with corrugated iron sheds. From these piers cars will be run upon floats to be ferried across the river. A good deal of work has been done in filling in the flats and old docks in the vicinity. The company has been authorized to cross at grade two of the principal streets of Jersey City.

**Milwaukee, Lake Shore & Northwestern.**—The Wisconsin River branch has been opened for business from Pratt Junction, on the Northern Division, to Parrish and Harrison (formerly Mitchell), Wis., a distance of 18 miles.

**Nebraska, Kansas, & Colorado.**—Charter filed in Kansas for a company of this name to build a road from Lenora, Morton County, to Allison, Decatur County, thence west or southwest through the counties of Sheridan, Thomas, Logan, Wichita, and Greeley, to the south line of the state of Kansas; thence to Trinidad, Col.; also a line from Allison, northeast through the counties of Norton and Phillips to the north line of the state of Kansas. The road will be of standard gauge and about 300 miles in length. The capital stock is placed at \$10,000,000.

**Newfoundland.**—The Government of Newfoundland has invited tenders until March 18 for the construction and operation of a line of railroad in the colony 250 miles long. Tenders are to be addressed to the Colonial Secretary, St. John's, or to Seward, Da Costa & Guthrie, 26 Nassau street, New York.

A line has already been built on the island from St. John's west to Spread Eagle, and thence to Harbor Grace. This road it is proposed to extend in a northwesterly direction about 200 miles, thence turning north-easterly to Hall's Bay, on the east coast. The construction of the road will greatly aid fishermen, who, instead of being compelled to make the perilous journey from the northern fishing grounds to St. John's, will be able to forward their cargoes by rail from Hall's Bay.

**New York, Lake Erie & Western.**—The company is making improvements at Buffalo which will give it largely increased facilities for handling its coal traffic. The contract has been let to William S. Grattan, of Buffalo, for building an addition to the coal dock and coal pockets on the ship canal. Work has begun on 56 additional pockets, giving the company 86 coal pockets, with a total capacity of about 110,000 tons of coal. The additions will make the dock and pockets about 1,600 ft. long. Another hoisting engine is to be put in, and next spring a Harrison conveyor will be added. At East Buffalo a transfer trestle and storage shed will be erected. Each will be about 500 ft. long and about 500 ft. wide. A Brown hoist will also be used. The trestle and storage shed will provide storage for coal which at present must be left in cars. Messrs. Cofrade & Evans, of Jersey City, have the contract for building the trestle and shed.

**Northern Pacific.**—The controversy between the United States Government and this road concerning the cutting of timber on government land by the railroad company's agents or licensees has now taken the form of a suit in the United States Circuit Court, the Attorney-General of the United States having entered the case at St. Paul on Jan. 3. It is claimed that large quantities of lumber were cut for sale on land which had not been surveyed. In this territory the lines between the government land and that granted to the road were undefined, and the illegal cutting is said to have occurred in consequence of this failure of the government to make surveys. But the road denies the charge, claiming that all lumber so cut was for use in constructing the road as allowed by law. Lumber for sale was cut from lands to which the road's claim was undisputed.

**Northern Pacific & Manitoba.**—The Railway Committee of the Dominion Parliament last week granted an order permitting the Portage extension of the road to cross Pembina Mountain and the Manitoba & Southwestern branches of the Canadian Pacific. The committee has decided that the work be performed by the Canadian Pacific, the Railway Commissioners of Manitoba bearing all the expense. The Railway Committee, however, declined for the present to permit the road to cross the Canadian Pacific main line, taking into consideration the fact represented by the Canadian Pacific, that the Northern Pacific & Manitoba had only a provisional charter and that as the object was to construct a line into a foreign locality the jurisdiction of granting a charter was vested alone in the Dominion Government.

This company will apply to Parliament at Ottawa for an act of incorporation with power to construct and operate the following lines: First, a line from a point at or near the city of Winnipeg on the west side of the Red River to a point on the international boundary line at or near West Lynne; second, a line from a point at or near Winnipeg in a westerly direction to Portage la Prairie; third, a line from a point at or near Morris in a westerly direction into the district of Assiniboia; fourth, a line from a point on the proposed line extending westerly from Morris to the town of Brandon.

**Northwestern & Lake of the Woods.**—An act of incorporation is being applied for by this company with power to construct a road from West Lynne, Manitoba, to the towns of Portage la Prairie and Brandon, with branch lines as may be decided upon.

**Old Colony.**—On Jan. 1 the company took possession of and commenced operating the Providence, Warren & Bristol, and the Fall River, Warren & Providence roads, as part of the Providence division of the Old Colony. The jurisdiction of the officers of the Old Colony has been extended over the roads. The control passed into the hands of the Old Colony at the time of the lease of the Boston & Providence.

**Oregon Railway & Navigation Co.**—The Hepner Branch, completed some time ago, has been opened for business from Willows Junction, on the main line, south-

ward to Hepner, Or., a distance of 45 miles. The Palouse Division has also been placed in operation from Farmington, northward to Rockford, Wash. Ter., a distance of 34 miles.

**Oregon & Washington Territory.**—The Walla Walla Division has been opened for business from Hunt's Junction to Walla Walla, Wash. Ter., a distance of 53 miles; The Eureka Flat branch from Eureka Junction to Pleasant View, Wash. Ter., a distance of 20 miles; the Pendleton Division, from Hunt's Junction, Wash. Ter., to Fulton, 30 miles, and the Centerville branch from Junction to Centerville, Or., a distance of 34 miles, have also been opened for business.

**Ottawa Terminal Railway & Bridge Co.**—This company is seeking incorporation for the purpose of constructing a bridge over the Ottawa River and short lines of railroad to concentrate all lines running into the city of Ottawa at one point near Suppers Bridge and the erection of a Union station with that object in view.

**Paducah & Tennessee.**—The projectors of this road have asked Paducah, Ky., for a subscription of \$100,000, and a vote will be taken Jan. 25 on the subject.

**Pennsylvania.**—Work has been commenced on the Unity Branch of the Southwest system of the road. The road connects with the main line at Latrobe, Pa., and at Summit divides into two branches, one extending to Lippincott, a distance of seven miles, the other running to Whitney, a distance of eight miles. At each terminal are the plants of the Hostetter Coke Company, each including 300 ovens.

**Pennsylvania, Poughkeepsie & Boston.**—The line from Poughkeepsie to Campbell Hall, N. Y., a distance of about 36 miles, will be completed and ready for operating within 90 days. The contract has been let to Baird & Co., of New York, for grading, tracklaying and bridging 73 miles of road from Slatington, Pa., toward Campbell Hall, N. Y. Over 200 men are now at work on this section, and the contractors expect to have 30 miles of the road completed within three months and all by Sept. 1.

**Philadelphia & Reading.**—The improvements made during the last year in the permanent way of this road have been summarized in the *Public Ledger*. Almost the entire line between New York and Philadelphia is now relaid with 85 lb. and 90 lb. rail. It is the purpose of the Reading and the Central of New Jersey to have a four-track line ultimately between New York and Philadelphia, and with that end in view many long sidings have been built at various points along the line. From Jenkintown to Bound Brook, N. J., the distance between tracks has been increased to 7 ft. to allow for greater width of cars, and various changes in grade have been made to take out minor irregularities. A large part of the line is now stone ballasted, and the ditches have been deepened and widened. All of the 35 bridges of the Reading, between Philadelphia and Bound Brook, have been re-enforced or replaced by plate girders. The Delaware River bridge, at Yardleyville, has been strengthened. Various stone arches and culverts have been also strengthened or rebuilt. A water-station, with a capacity of 50,000 gallons, has been built at Jenkintown. About 15 miles of third and fourth track between Philadelphia and Bound Brook are laid, and a good deal has been done in the way of additional yard tracks.

The board of managers have announced that the payments of interest on the first and second preference bonds would be 7½ per cent. each and 2½ per cent. on the thirds, payable Feb. 1, out of the earnings of the 18 months ending Nov. 30, 1888. The amount of these bonds are: First, \$24,000,000; second, \$16,000,000, and third, about \$20,000,000. The interest to be paid on the firsts is, therefore, \$1,800,000; on the seconds is \$1,200,000, and the thirds in the neighborhood of \$500,000; making a total of \$3,500,000 to be distributed by the company in addition to its fixed charges.

The paint shop of the company at Reading was destroyed by a hurricane Jan. 9. The shop with several passenger cars was burned up, and the gas tanks of the cars exploded, injuring a number of men, and it is reported killing two.

**Pittsburgh & Western.**—The company will lay a second track from Allegheny City to Calery Junction, Pa. A contract for 3,000 tons of steel rails has been made with the Edgar Thomson Steel Co. The Pittsburgh, Shenango & Lake Erie will enter Allegheny City over the Pittsburgh & Western from Calery Junction. The Pittsburgh & Western has five ore docks at Fairport, and it is said that persons connected with the former road are promoters of a movement to place a line of ore carriers on the lakes, from the Lake Superior and Gogebic regions, the cargoes being discharged at Fairport.

**Prince Edward Island & Continental.**—This company is seeking incorporation for the purpose of constructing a line of railroad from Buctouche to Kingston, New Brunswick, thence to Richibucto Cape, to connect by ferry with the Prince Edward Island Railroad.

**Qu'Appelles, Long Lake & Saskatchewan.**—An extension is asked by this company for the completion of a portion of its road and an act to confirm its transfer to the Canadian Pacific. It is to form a branch line of the latter road.

**Raritan River.**—That part of the road from South Amboy, N. J., westward seven miles to South River, has been completed and opened for freight traffic. The remaining 13 miles to New Brunswick will soon be completed. The terminus of the road will be Bound Brook, N. J.

**Red Deer Valley.**—This company is applying for an act of incorporation with power to construct a line from Cheadle Station on the Canadian Pacific, in Alberta district, running in a northeasterly direction to the Red Deer Valley coal fields; also to construct a branch line running from a point on the main line to Calgary.

**Red River, Sabine & Western.**—It is expected that the survey for this road will be commenced early this or next month. The road is to extend from San Augustine, Tex., southeast toward the Sabine River, a distance of about 32 miles.

**River Credit Loop Line.**—This company is asking for an act of incorporation giving power to construct a line of railroad from Inglewood station, on the line of the Canadian Pacific, in the county of Peel, Ont., following the general course of the River Credit to Churchville, in the same county.

**Rupert & Bloomsburgh.**—This road, chartered last week, and which is a branch of the Philadelphia & Reading, has been organized by the election of Austin Corbin as President. The new line will connect with the Clearfield & Jefferson road, and extend between the points mentioned.

**St. Johnsbury & Lake Champlain.**—The Victory Branch has been opened for business from North Concord, Vt., northward to Stevens, Vt., a distance of 12 miles.

**St. Lawrence & Atlantic Junction.**—This company is applying for an extension of time for commencing and completing its railroad.



**St. Louis & Chicago.**—A number of the largest security holders of the company held a conference in Chicago this week, at which it was decided to default on the interest on the bonds of the company, and to ask for a Receiver. On their application, Judge Gresham, of the United States Circuit Court, appointed Robert J. Cavett Receiver of the road. The road is a little over 70 miles long, and runs from Springfield to St. Louis. The first bonds issued were to the amount of \$500,000. Afterward between \$7,000,000 and \$12,000,000 of "second consolidated bonds" were issued, and conflicting claims as to the priority have led to the application for a Receiver.

**Southern Pacific.**—The company has lately paid to the state of California \$521,679.70, the amount of taxes due the state on the assessment of the State Board of Equalization for 1888, upon all railroad property owned or controlled by the Southern Pacific Co. in California. The company has already paid all the taxes due counties on the valuation made by the County Assessors for the year 1888, amounting to about \$300,000 more, making a total paid by the Southern Pacific Co. to the state and counties, as complete taxes assessed for 1888, of nearly \$900,000. This state tax has been contested, and the road states that the taxes are not now paid, because it thinks the assessment a fair one, but in the hope that the assessments hereafter will be equitable and just to the company and state.

**South Pennsylvania & Ohio.**—The locating survey is being made between Aurora and Farmington, O., a distance of 17 miles. This is to be ready for tracklaying by June 1, and the balance of the road to the state line, 55 miles, by Oct. 1.

**Tennessee Midland.**—The extension east from Jackson, Tenn., has been completed through Madison County to the Henderson County line, about 12 miles, and tracklaying has been completed for about eight miles farther. It is expected that the road will reach Lexington, in Henderson County, this month. Jackson will issue bonds to the amount of \$125,000 for a like amount of stock in the road.

**Texas Grand Trunk.**—The company has filed a charter in Texas to build a road from the Sabine River, near Hemphill, westerly and southwesterly to Eagle Pass; also branch roads from Marble Falls, Burnett County, to Camp Lancaster, on the Pecos River; from Marble Falls to Burnett; from a point in Falls County to Waco, and from Marble Falls, on the main line, to Austin, an estimated total distance of 750 miles. The capital stock is \$1,000,000, and the principal business office will be in Temple, Bell County.

**Texas Western.**—In the case of the Farmers' Loan & Trust Co., of New York, against this company (whose road is now operated by a receiver) the United States Circuit Court at Galveston, Tex., last week issued a final decree of foreclosure. The terms stipulated in the decree are that no bid less than \$200,000 shall be accepted.

**Toronto & Belt Line.**—An act of incorporation is asked by this company for the purpose of constructing and operating a line from a point on the Grand Trunk or Canadian Pacific in the eastern part of Toronto, passing to the north of the city, to connect with one or both of the said roads to the northeast of the city, or in the village of West Toronto.

**Ultima, Thule, Arkadelphia & Mississippi.**—This road has been opened for business from Daleville, westward to Dalark, Ark., a distance of ten miles. At the former place the road connects with the St. Louis, Iron Mountain & Southern.

**Versailles & Midway.**—An agreement was made last week between President Bennett H. Young, of the Louisville Southern, and the magistrates of Woodford County, Ky., by which the Louisville Southern and this road, which extends from Versailles, in Woodford County, to a connection with the Louisville Southern at Lawrenceburg, in Anderson County, will be consolidated. The magistrates control this road and have agreed to accept Louisville, New Albany & Chicago stock for an equal amount of Versailles & Midway stock. The road will hereafter be operated by the Louisville, New Albany & Chicago, as lessee of the Louisville Southern.

**West Penn & Shenango Connecting.**—The road was last week sold to a committee of bondholders, consisting of Samuel B. Dick, P. C. Hollis and R. H. C. Hill, for \$80,000. It is 22 miles in length, and extends from the town of Butler, in Butler County, to Coalton, Pa., on the line of the Pittsburgh, Shenango & Lake Erie road.

**Wheeling, Wellsburg & State Line.**—Two routes have been surveyed from Wheeling, W. Va., east toward Pittsburgh; one via Buffalo Creek and the other via Cross Creek Valley. The routes intersect each other 6 miles west of Cannonsburg, then to Pittsburgh, via Chartiers. Several lines have been run and prospecting into the city of Wheeling, to connect with the Union bridge now being built across the river at the head of Wheeling Island and which will connect with all Ohio roads centering at Martins Ferry. The estimated cost of the road is \$30,000 a mile. As already stated, contracts will be let as soon as the local aid of \$5,000 per mile (\$315,000) is obtained and the right of way secured. A large amount of the aid asked has been granted. An effort is being made with assurances of success of forming a syndicate to buy the bonds and to construct the road.

The road will be about 65 miles long, and it is reported that there will be comparatively light grades. The route surveyed is along water-courses much of the distance; one or two summits will have to be crossed. Gas and oil fields will be traversed by the road, and there are also coal fields along nearly the entire route. If the road is built it will form a link in a route between Pittsburgh and Chicago, about 30 miles shorter than present lines.

**Williamsport & Binghamton.**—Work has been commenced on the Williamsport end of this road, near Loysalock, Pa., where a heavy cut will have to be made. The force at Williamsport will soon be increased to 360 men. Work is also being pushed on the Binghamton end of the line. It is being constructed from Williamsport, Pa., to Binghamton, N. Y., 110 miles, and Belden & McTigue, of New York, are the contractors.

**Williamsport & North Branch.**—A syndicate composed of H. H. Houston, Henry D. Welch, William L. Elkins, Sidney F. Taylor, and other Philadelphia and Williamsport capitalists, has purchased the road, and it is said, will complete it according to the original plan. The road extends from Hall's Station, on the Philadelphia & Reading, several miles east of Williamsport, to Nordmont, a distance of 30 miles, and it is to be extended to Bernice, 11 miles further on, where a connection will be made with the State Line & Sullivan road. The new owners propose to connect it with the Philadelphia & Erie by building a bridge across the Susquehanna River at Hall's to the west bank.

**Winnipeg & Northern Pacific.**—This road is applying for an extension of time for the commencement of the construction of its road for a period of three years beyond the time mentioned in its act of incorporation, and also for a reduction in the number of miles to be thereafter constructed each year to 20 miles.

## TRAFFIC AND EARNINGS.

## Traffic Notes.

A large plant is to be erected at Newton, Kan., for the manufacture of salt.

The Union Palace Car Co.'s sleeping cars will begin running on the lines of the Richmond & Danville system on Jan. 25.

The Housatonic road, or the Transfer Company controlled by it, is having built 3 floats for transporting cars between New York city and Norwalk, Conn. They will carry 30 cars each, and each has propelling power of its own.

At Goldsboro, N. C., competition between rival railroads for the transportation southward of large numbers of negroes who had been to Goldsboro for the holidays, became so sharp that speakers were employed by the competing lines to harangue the crowds on the street corners. Large audiences of negroes listened, but they became so excited that police interference was necessary.

It is stated that ticket-broker Frank, of Chicago, has about 1,000 limited tickets between that city and Kansas City, over various roads, which were transferred to him in consideration of his surrender of the large blocks of Wabash unlimited which was recently made. The limited tickets are dated sometime ahead, and serious disturbance of rates seems likely. The Chicago & Northwestern threatens to reduce the limited fare to Council Bluffs to \$10.50.

It is said that the Louisville & Nashville has a contract for carrying 1,000,000 bu-bels of coal from Birmingham, Ala., to Mobile to go to Cuba for the Spanish government.

The Erie will close its Philadelphia office on Feb. 1, being represented thereafter by the Lehigh Valley. The Erie will withdraw its independent agencies at several other cities on the same day.

## Cincinnati-Texas Rates.

J. W. Midgely, J. N. Faithorn and J. M. Johnson, of Chicago, who were appointed by the International Association (Texas Traffic) a short time ago to arbitrate the question of rates from Cincinnati and Ohio River points to points in Texas, have just announced their decision. They decide that through rates from Cincinnati to points in Texas shall be ascertained by adding to the rates from St. Louis to the same point differentials as follows: First class, 20 cents per 100 lbs.; second, 15 cents; third, 12 cents; fourth, 10 cents; fifth, 7 cents; Class A, 9 cents; Class B, 8 cents; Class C, 7 cents; Class D, 6 cents; Class E, 5 cents; coal and water-pipe, 5 cents; wire and nails, 5 cents; soap, 6 cents; candles and starch, 7½ cents; whisky, 10 cents. This will go into effect Jan. 20.

## The Kentucky &amp; Indiana Bridge Case.

Judge Jackson of the United States Circuit Court, at Louisville, Ky., has handed down an opinion in the case of the Kentucky & Indiana Bridge Co., petitioner, against the Louisville & Nashville road, respondent, on the appeal of the latter from the decision of the Interstate Commerce Commission ordering it to receive freight from the petitioner at Seventh and Magnolia streets.

The Court reverses the decision of the Interstate Commerce Commission, sustaining the dissenting opinion of Commissioner Schoonmaker that the petitioner is not a common carrier. It is only a transfer agent as to the freight offered, and the tolls it collects are not a charge for transporting freight, but are charges for the use of the structure. The bridge company does transfer some cars, but for this it is only a switchman or transfer agent. The exchange at Magnolia avenue, which is not a freight station, would benefit the bridge company and injure the respondent, and would give the Ohio & Mississippi road, which operates the bridge, an undue advantage over the other roads, which have to exchange freight with the respondent at Ninth avenue and Broadway, which privilege is open on equal terms to the Ohio & Mississippi.

On the question of jurisdiction the Court holds that the Interstate Commerce Commission has not final jurisdiction, and that its decisions are subject to review upon appeal to the Federal court, in which case the findings of the Commission are similar to a report of a Referee. It is not merely the province of the United States Circuit Court to enforce the judgments of the Commission, but to act upon them as an original proceeding. The bridge company was granted an appeal to the United States Supreme Court.

## Cotton.

The cotton movement for the week ending Jan. 4 is reported as follows, in bales:

	1888.	1887.	Inc. or Dec. P. c.
Receipts.....	92,383	62,108	L. 37.275 60.0
Shipments.....	110,747	94,187	L. 16,560 17.6
Stock.....	448,680	461,804	D. 13,124 2.8
Seaports:			
Receipts.....	202,924	159,308	L. 43,616 27.4
Exports.....	167,612	138,573	L. 29,039 21.0
Stock.....	907,093	1,043,776	D. 136,743 13.9

## East Bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Jan. 5, amounted to 103,664 tons, against 90,409 tons during the preceding week, an increase of 13,255 tons, and against 79,017 tons during the corresponding week of 1887, an increase of 24,647 tons. The following table gives the proportions carried by each road:

	W'k to Dec. 29.		W'k to Jan. 5.	
	Tons.	P. c.	Tons.	P. c.
Wabash.....	5,075	5.9	11,581	11.5
Michigan Central.....	10,875	12.0	5,431	5.2
Lake Shore & Mich. So.....	10,176	11.2	10,980	10.6
Pittsburgh, Ft. W. & Chicago.....	10,533	11.6	14,754	14.2
Chicago, St. L. & Pittsburgh.....	5,208	5.7	4,886	4.7
Baltimore & Ohio.....	12,605	14.0	12,607	12.2
Chicago & Grand Trunk.....	12,904	14.3	16,334	15.8
N. Y., Chicago & St. Louis.....	11,960	13.2	12,333	11.9
Chicago & Atlantic.....	10,983	12.1	8,449	8.1
Total.....	90,409	100.0	103,664	100.0

Of the above shipments 5,604 tons were flour, 72,240 tons grain, 2,730 tons mill stuff, 3,241 tons cured meats, 2,045 tons lard, 6,797 tons dressed beef, 1,421 tons flaxseed, 831 tons butter, 1,621 tons hides, 155 tons wool, and 1,918 tons lumber. The three Vanderbilt lines carried 39.5 p. c., while the two Pennsylvania lines carried 18.9 p. c.

## Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

LOUISVILLE, NEW ORLEANS & TEXAS.			
Month of November:			
	1888.	1887.	Inc. or Dec.
Gross earnings.....	\$287,196	\$296,227	D. \$9,031
Oper. expenses.....	176,835	171,008	I. 5,827
Net earnings.....	\$110,361	\$124,619	D. \$14,258

## CAIRO, VINCENTS &amp; CHICAGO.

Month of November:			
	1888.	1887.	Inc. or Dec.
Gross earnings.....	\$65,682	\$67,488	D. \$1,806
Oper. expen. and taxes.....	43,173	49,264	D. 6,091
Net earnings.....	\$22,509	\$18,224	I. \$4,285

## MILWAUKEE, LAKE SHORE &amp; WESTERN.

Year to Dec. 30:			
	1888.	1887.	Inc. or Dec.
Gross earnings.....	\$2,822,848	\$3,180,681	D. \$357,833
Oper. expenses.....	1,614,947	1,940,358	D. 325,411
Net earnings.....	\$1,207,901	\$1,240,323	D. \$32,422
Miscellaneous.....	13,000	47,773	D. 34,773

Total net earnings:			
	1888.	1887.	Inc. or Dec.
Int. and rentals.....	\$1,220,901	\$1,288,056	D. \$67,155
Taxes.....	608,895	517,687	I. 91,208
Taxes.....	124,290	31,307	I. 93,083
Total charges.....	733,185	548,594	I. 184,591

Net revenue:			
	1888.	1887.	Inc. or Dec.
Dividends.....	\$487,710	\$739,062	D. \$251,346
Surplus.....	\$300,000	\$300,000	D. 130,000
Surplus.....	\$187,710	\$309,062	D. \$121,346

## Month of November: 1888.

	1888.	1887.	Inc. or Dec.	P. c.
Allegheny Valley.....	\$197,268	\$173,830	I. \$23,438	13.5
Net.....	99,062	77,349	I. 21,713	28.1
Atch., Top. & S. F.....	1,460,371	1,657,078	D. 196,707	11.2
Net.....	630,781	829,783	D. 199,002	24.0
Canadian Pacific.....	1,328,944	1,286,237	I. 42,707	3.3
Net.....	579,262	511,069	I. 68,193	13.3
Carolina Central.....	63,416	56,975	I. 6,441	11.3
Net.....	16,822	16,822	I. 27,369	16.3
Cin., N. O. & Tex. P.....	300,589	324,116	D. 23,527	7.8
Net.....	98,000	135,119	D. 42,119	31.2
N. O. & Northeast.....	105,559	81,851	I. 23,708	29.0
Net.....	34,000	25,000	I. 9,000	36.0
Vicks. & Meridian.....	66,060	63,706	I. 2,354	3.7
Net.....	31,000	31,000	I. 13,694	15.4
Vick., Shreve. & P.....	75,415	69,109	D. 6,306	8.3
Net.....	27,000	49,000	D. 27,854	23.6
Den. & Rio Gr. W.....	145,540	117,386	I. 28,154	26.5
Net.....	60,710	36,909	I. 23,801	64.5
Flint. & Pere Mar.....	193,032	217,564	D. 13,932	6.4
Net.....	64,383	64,153	I. 230	.4
Ft. Worth & Den. C.....	124,137	73,167	I. 50,970	69.6
Net.....	47,637	30,282	I. 17,355	57.2
Louis. & Nashville.....	1,341,787	1,501,898	D. 160,111	10.6
Net.....	499,670	638,282	D. 138,612	29.2
Louis, N. O. & Tex.....	287,196	296,228	D. 9,032	3.0
Net.....	110,362	124,619	D. 14,257	11.4
N. Y., L. E. & W.....	2,290,298	2,390,338	D. 130,100	5.4
Net.....	813,663	814,239	D. 576	...

Net less due			
Leased lines.....	626,009	607,090	I. 18,919 3.1
N. Y., Ont. & West.....	129,523	131,873	D. 2,350 1.8
Net.....	7,346	18,486	D. 11,140 60.2
Norfolk & Western.....	427,096	410,211	I. 17,485 4.5
Net.....	151,352	178,392	D. 27,040 15.2
Northern Pacific.....	1,808,612	1,640,140	I. 258,472 15.7
Net.....	902,090	904,817	D. 42,787 4.7
Ohio & Mississippi.....	291,588	337,328	D. 45,740 13.5
Net.....	53,955	82,563	D. 28,608 34.6
Omaha & St. Louis.....	37,439	37,850	D. 411 1.1
Net.....	1,675	4,960	D. 3,285 65.7
Philadelphia & Erie.....	412,333	367,724	I. 44,609 12.1
Net.....	139,738	142,573	D. 3,135 2.2
Pitts. & Western.....	186,612	181,988	I. 4,624 2.5
Net.....	48,277	57,302	D. 9,025 15.7
Rome, W. & Ogd.....	291,231	280,347	I. 10,884 3.9
Net.....	135,610	132,655	I. 2,955 7.8
Seaboard & Roanoke.....	77,127	71,469	I. 5,658 7.9
Net.....	36,561	31,584	I. 4,977 15.7
West N. Y. & Penn.....	286,085	233,575	I. 46,510 19.9
Net.....	55,192	32,997	I. 22,195 67.2

## Month of October:

	1888.	1887.	Inc. or Dec.	P. c.
Central Pacific.....	1,574,058	1,318,100	I. 255,958	19.4
Net.....	636,209	618,365	I. 17,844	2.8
Southern Pacific Co.....	222,643	102,778	I. 59,865	36.7
Net.....	83,274	83,274	I. 24,737	29.7
South. Div. (Cal.).....	606,093	492,307	I. 3,286,185	41.4
Net.....	182,291	210,156	D. 27,865	15.3
Arizona Div.....	164,818	143,148	I. 21,670	15.1
Net.....	def. 9,791	31,024	D. 40,815	...
New Mexico Div.....	82,019	36,119	I. 45,900	127.1
Net.....	28,812	1,923	I. 26,889	...

## Eleven months—Jan. 1 to Nov. 30:

	1888.	1887.	Inc. or Dec.	P. c.
Allegheny Valley.....	\$1,915,421	\$1,850,060	I. 65,361	3.5
Net.....	824,764	724,043	I. 100,718	13.9
Atchison, T. & S. F.....	14,300,107	16,965,412	D. 2,765,305	15.9
Net.....	4,842,051	5,928,236	D. 3,286,185	41.4
Canadian Pacific.....	12,049,094	10,151,672	I. 1,897,422	15.2
Net.....	3,452,101	3,140,411	I. 311,693	9.9
Carolina Central.....	490,268	468,202	I. 22,066	4.8
Net.....	194,511	148,589	I. 45,922	30.9
Cin., N. O. & Tex. P.....	3,304,993	3,079,455	I. 225,538	7.3
Net.....	996,000	1,165,657	D. 169,657	14.6
N. O. & Northeast.....	788,824	628,146	I. 160,678	25.6
Net.....	112,000	101,000	I. 11,000	10.9
Vick. & Meridian.....	432,141	494,349	D. 62,208	12.6
Net.....	71,000	86,000	D. 15,000	17.4
Vick., Sh. & Pac.....	501,419	536,450	D. 35,031	6.5
Net.....	110,000	147,000	D. 37,000	25.2
Den. & Rio Gr. W.....	1,245,736	1,079,384	I. 166,352	1